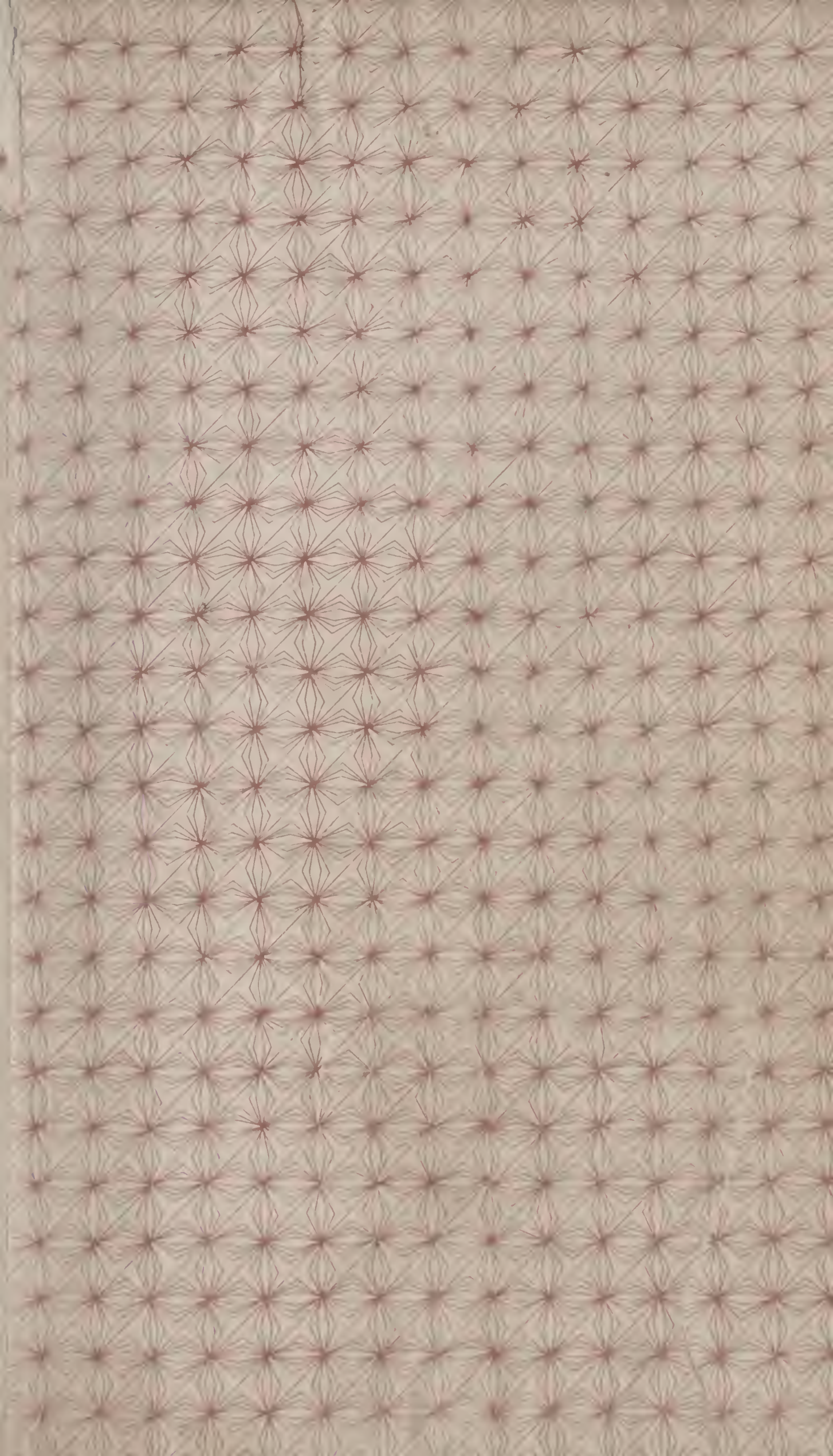


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*From Photo by Paul Laib, after a Painting by Alfred Priest.*

Frontispiece.

*Mae Amberton*



# THE AMATEUR MOTORIST

BY

MAX PEMBERTON

Motoring Editor of "The Sphere"

*WITH 68 ILLUSTRATIONS*

*Mostly from Photographs*

Chicago

A. C. McCLURG & CO.

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## AUTHOR'S FOREWORD

THIS book is in some measure the development of certain articles I have been privileged to write for *The Sphere*. These are reproduced by the kind permission of Mr. Clement K. Shorter and the proprietors of that journal. I would also record my indebtedness to Mr. Eustace Gray, Mr. A. L. Haydon, and to my brother, Mr. Algernon Pemberton, for their unfailing readiness to help my project.

If any further word be needed, it is one which would disclaim any technical merit for this book. My chapters are addressed entirely to amateurs. I have endeavoured to write both for those who own cars and for those who would own them—helping the former by a record of personal experiences, and the latter by a restatement of those elementary facts which are often obscured in the more scientific discussion of the petrol engine.



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# THE AMATEUR MOTORIST

## BOOK I

### THE MAN

#### CHAPTER I

##### THE MOTORIST OF YESTERDAY

THE small boy who was asked whether he would sooner be Lord Kitchener or Napoleon chose the former rôle unhesitatingly—because, as he wisely reminded us, Napoleon is dead.

The Motorist of Yesterday, if he be not dead (and then let us suppose he is driving a forty-horse Helios car across the starry kilometres of the heavens), is very much the Motorist of To-day—and will be, should fortune permit, the Motorist of To-morrow. I know no sport which wins a finer loyalty from its devotees ; none which so breathes upon them the spirit of a lasting enthusiasm. Those who abandon it rarely do so because they are not motorists at heart. The spell of it is unfailing—the grip of it is sure.

It is for such a reason that I shall make no attempt in this volume to write the story of the motor-car. That has been done, and well done, many a time and oft. The Marquis of Chasseloup-Laubat, Lord Montagu, the Hon. C. S. Rolls—eloquent writers bubbling with facts—have told us eloquently of the prehistoric days. We have read twenty times if we have read once of Cugnot's steam carriage which astonished all France in the year 1769—and not only astonished France, but so bravely charged the enclosure in which they "let it off" that

few of the spectators henceforth would come within a mile of it. We know of Hancock, who ran a merry steam coach in England in the year 1833, and attained a speed of thirty miles an hour. We remember the monstrous machine which Squire and Macerone built; we know of Goldsworthy Gurney's famous vehicle propelled by steam and fired by coke. These are historic and of the British Museum. The sage who reminds us that but for Parliament and the horsey man England would have been nearly seventy years ahead of her competitors in the matter of road traction is echoing a truth uttered *ad nauseam*. We know all this—the "manuals" have done their duty brilliantly.

What, then, of the Motorist of Yesterday? How did he come to be? What were his tribulations and his joys? The study is useful, as the study of evolution ever must be. I recall many names as I write—the names of lusty pioneers, of Mr. Elliot, of the Hon. C. S. Rolls, of Mr. Ellis and Sir David Salomons, who, all honour to them, threw a stone at an antique law and first taught us to lisp first principles.

These were they who, clad not in white raiment but in reeking oilskins, first brought the good news from France; who first enlightened us as to what France was doing. They spoke of a revival in that excellent country dating from the introduction of the Léon Bollée steam vehicle in the year 1873. They told us of Count de Dion, who, beginning with a steamer, soon came to design a petrol engine which has had no rival in the story of motoring. They narrated the history of the Otto cycle, showed us how Herr Daimler had adapted it; they brought the name of Monsieur Levassor across the water and cried in the market-place the merits of "essence." So to dull ears the awakening came. That which could not be done in England in the year 1833 because of the laws was also forbidden in the year 1894. But these men determined that it should be forbidden no longer.

I was one of those who read from time to time the news of the new industry, as France was beginning to establish it. I remember well trying to master the principles of the Otto cycle, and being so much impressed by the possibilities of a



gas engine as to use it for the purposes of romance. This would have been in the year 1893, but three years were to pass before I rode in a self-propelled carriage. In the meantime the more far-seeing of our newspapers did not fail to record all that was being done across the Channel. Apathetic as the public was, it could not fail to be impressed by the story of the first Paris-Bordeaux race, gallantly won by Monsieur Levassor on the first of the famous Panhard and Levassor carriages. Seven hundred and thirty-two miles accomplished in forty-eight hours and forty-eight minutes were sufficient to make even the horsey Englishman open his eyes. Here was a machine which attained a speed of some twenty miles an hour, which accomplished the whole journey without any considerable breakdown, which weighed but eleven and three quarter hundred-weights (approximately), and carried two passengers in comfort. The truth of it was amazing—it was also in a measure the Emancipation Act of 1896.

As the Marquis of Chasseloup-Laubat has told us, this race was remarkable not only for its achievement, but for the final triumph (for a decade at least) of petrol over steam. In the great Paris-Marseilles race of the year 1896 another Panhard-Levassor carriage was driven to victory by Monsieur Mayard, and this beyond all cavil was the father of the motor-car we use. Nothing to my mind is so astonishing as the attainment as it were at a single coup of all the essential features of the modern machine. Here in Monsieur Levassor's car you had a four-cylindere engine driven by the explosions of the vapour of petrol; here you had a gear-box with the familiar change-speed lever—the clutch, the side chains, the differential. Improvements we have made abundantly, but the novelties even in the latest car are few indeed. And all this was the work of one head—one clever engineer who endowed us in an instant with this wonderful equipment. Truly should the name of Levassor be honoured by all who would write justly of this tremendous movement. No other man has done as much—no other surely ever worked with a greater perspicuity or a more unqualified success.

And so I come to the great Emancipation, to the days when

the new locomotion was fiercely but not unkindly debated in the House of Commons ; when at last, after many years, the man with the red flag was sent to the right-about, and we were free to go and come as we would and as we could. Naturally the passing of the Act of 1896 brought few motors immediately to our streets. I was in London at the time, and I cannot recollect meeting a single carriage until the month of October, when in the North of London I came upon an old friend gloriously mounted upon one of the first of the old Benz models. Wonderful vehicle ! How well it looked to my untrained eyes—a gem of a little carriage with bicycle wheels and a shapely body, and an engine thumping away at the aft end of it ! This was the first automobile I entered. Candour compels me to admit that I cut no fine figure in it.

My friend, of course, was enthusiastic. What old motorist of the glorious days was not ? I remember the pains he was at to show me its capabilities. He could do twenty-five miles an hour, he said, and stop the thing in three yards. An attempt to do so went near to landing us on the top of a horse omnibus, and we began again. This time something appeared to happen in the neighbourhood of the poop. The machine did not exactly kick, but it lifted a leg, as it were, and looked angry.

An investigation, completed to the satisfaction of twenty boys and a cabman, who obligingly asked if his whip would be any good, seemed to console my friend greatly. He covered his hands and his forehead with a smear of thick oil, and then said that something (I forget what) had upset the other thing (which has also escaped my recollection). At the end of half an hour we proceeded another three hundred yards, to the great delight of the populace. The fact that I clung to the carriage with both hands, remembered forgotten prayers, and generally wore a “ God-help-me ” air was lost upon my enthusiastic friend, who continued to remind me of the charms of the new pastime. When I wished him “ good-night ” we had made nearly a mile in an hour and a half, and I went home convinced that I must motor though the heavens (and the horse omnibuses) fell.

These old Benz carriages were those the public will remember best when it recalls the early days of the new sport. Whenever we met a motor "hung up" by the roadside—and that was no uncommon occurrence—be sure that it was a Benz in difficulties with its ignition. Carrying the engines aft, and access to them being by a door which let down in the manner of the flap upon a butcher's cart, the proprietor invariably wore the air of a man who was looking for a mutton chop he had mislaid, and would take some three weeks to find it. The great firm of Benz has made wonderful strides since those days, and its latest products are as fine as anything sold ; but its beginnings were distinctly of a halting nature, as every old motorist will remember. Had they not been so, some of us might have wearied of the pastime. We lived in the continuing delight of experience acquired. Every non-stop run—and how few they were!—was something to remember after many days. The recalcitrant engine became the beast that we hunted, and glorious were the trophies of victory.

My second venture in a motor-car was in company with my friend Lord Northcliffe. He had always been conspicuous among the pioneers, and was one of the early purchasers of the famous six-horse Panhard car. This was really a capital little machine—one of the very first in this country which taught us that the new form of traction had come to stay. Capable of a speed of more than twenty miles an hour, its reliability, even in those days, was remarkable. I remember well my first ride in this little car, and the astonishment which attended it. Why, there was no mutton-chop hunting whatever! Not once did the man get down and look for the meat in the cupboard. Very noisy we should consider it nowadays, and its vibration would astound us, but it rarely failed to arrive at its journey's end, and the fame of it established the success of the Panhard and Levassor firm beyond all question.

In such a car I accomplished some thousand miles or so, and never once was hung up by the roadside for more than a few minutes at a time. With the little De Dions, then



beginning to hammer about the roads, it saved the motor industry in England; for it taught us that cars could be made to go, and that the dwellers in tents were mere unfortunates who would learn better presently. In such little vehicles as these, the "six" Panhards, the first of the Peugeotts and De Dions, the Delahayes, and the Léon Bollée tricycles, the pioneer motorist lived his happy life. Possibly he was already a "road man." He knew the joys of travel through the English lanes—the great Bath Road had become as familiar to him as Regent Street; he had cycled from Land's End to John o' Groats—he held the name of Jarrott and of Edge in high esteem already. And now, although refusing to "patch up his old body for heaven," this prime of ease was suddenly revealed to him; this ability to do all he had done and to do it with legs at rest and body upright. To such the primary mechanical difficulties were but as specks upon a spotless horizon. A confident hope led him on. The day would come when all must be perfection.

And then, remember the novelty of the thing—the sensation these first appearances caused in town and village. I recollect entering a hamlet in Norfolk upon one of the earliest of the motor bicycles, and so scaring a limited populace that two old women there and then made a leap for the churchyard wall, and if they did not clear it at a bound, at least rolled over very cleverly. In the country roads panic ran riot. I have seen timid women run right away to the very centre of a field perhaps a quarter of a mile distant, at the approach of a motor. Once upon the St. Albans road, where I was driving an old twelve Panhard, a very long curate on a very small pony held up his hand for nearly ten minutes at a stretch. The pony was in no way alarmed, but the reverend gentleman must have suffered agonies. At last he fairly bolted through an open gate, whereupon the pony began to graze without so much as cocking an ear at us; while the reverend gentleman expressed the pious hope that such things would not long be permitted upon the road.

Most of these good people, I think, feared explosion.



*Photo lent by "Motor Cycle."*

The Early De Dion Tricycle.

6



*Photo by G. W. West, Rottingdean and Brighton.*

Ten Years Ago on a Bollée.





"Don't you bring her inside here," a Midland hotel-keeper once said to me; and added the conviction, "I'll warrant her'll explode." An engine without a boiler meant nothing to the popular mind. And, of course, the little Locomobiles were then beginning to flash about—and merry times we had with them. Well do I recollect the experience of a young undergraduate friend of mine who, attempting to drive from Cambridge to Edinburgh upon a Locomobile, was just three days upon the journey. Two nights he slept out on the open moors, and was not daunted. Every conceivable part of the machine afforded him amusement. I think he would have been disappointed had it not been so. And what a triumph when at last, black, begrimed, a very tramp in appearance, he steamed into Edinburgh and said: "Behold, it is your son!" This was necessary, as the parental edict set the dog upon all beggars.

We began to mask ourselves also about this time—and pretty rumours filled the society papers. Few novelists touched upon the motor-car, for they did not know one end thereof from the other; but the mask delighted the makers of *chroniques scandaleuses*, and they guffawed loudly. What—that women should hide their features from the world, and go forth upon machines that invariably broke down in lonely places? Deplorable! A matter for the bishops. And the bishops, we may suppose, cried anathema; those very ordinaries who are now careering about the country in twenty-horse cars, and bidding the chauffeur go "hell-for-leather" to the Confirmation Classes—by which expression (our own) no episcopal hard-swearing is intended, but merely the phrase commonly used upon the hunting-field.

The Motorist of Yesterday had to be many-sided—a man of patience, of some mechanical knowledge, of enthusiasm always, of hope eternal. Those were the days when we fired the charge in our cylinders by burners and white-hot tubes, and many a pretty bit of fun did the process afford. I recall an occasion upon the St. Albans road when—a pushing salesman having taken a friend and myself out in an original Daimler car—there was a terrible flare-up under the burner,

and beautiful flames shot skyward to the height of the lamp-post. My friend—an exceedingly nervous man, who had suffered agonies upon the journey—simply sat speechless, while the salesman blandly assured us that this was merely a clever device for warming up the engine. We came near to cremation, but happily escaped it in the end; it took some six good years to reassure my nervous friend, and to this day he is not wholly comfortable in a motor-car.

All this, needless to say, did not impress the public with the virtues of the new movement. At times, I think, it came near to painless extinction—just as the old steam-carriages had been extinguished by “horsey” England in the 'thirties. There were accidents—then came the dust. Every old woman in the country, all the old women upon the benches, rural vicars, notoriety-hunting members of Parliament, those interested in the stable, farmers, horse-dealers, cab proprietors, job masters—every one who could make twopence out of the “noble animal,” cried out loudly for the suppression of the industry. Motor accidents were made the most of in the press (a practice but little abated in our own time). The original Act of 1896, permitting us to motor upon the roads, was amended by the more drastic legislation of 1903, by which we were numbered and licensed, our speed set at the preposterous limit of twenty miles an hour, and a weapon put into the hands of country benches which, whatever our prejudices, we must admit has been grossly abused. All this, however, has but stimulated this splendid pastime, this colossal industry. As the new cars came along, it began to be perceived that the automobile must play a large part in the locomotion of the future. The introduction of the famous *Mercédès* in the year 1902 brought us at once in touch with the modern machine as we know and drive it. Subsequently history has been but a development of *Mercédès* ideas. We have copied them, adapted them, improved upon them, but have introduced little that is really novel.

For, in truth, the *Mercédès* car made the Motorist of To-day; and who knows that from the same great house will not come the Motorist of To-morrow.

## CHAPTER II

### THE MOTORIST OF TO-MORROW

ROMANCE dreams great dreams for the Motorist of To-morrow ; but few of them are likely to be justified by the slow and unimaginative march of reality.

I have read stirring word-pictures of this England of ours as the twentieth century and the motor-car will make it ; but few of them move me to a sense of conviction or to anything beyond an admiration for the literary skill of those who write them.

These dreamers are of many dispositions : some wholly optimistic ; some who dwell upon little except a manufacturer's opportunities ; others who merely generalise and are, I fear, woefully ignorant of elementary mechanical truths. The first is the most readable fellow, the second the most instructive, while the third may be left to the monthly magazine and the editor in search of a new sensation.

Let us abide a little while with our cheery optimist and try to follow his glorious flights. The motor-car, says this worthy scribe, will be universal in ten years' time—for he is a lover of the decimal system, you will note. The finest cars will be sold for £250, and every city clerk will have a car of some kind or other and keep it as a matter of course in the outhouse in his garden. Such universal possession will call for the creation of special roads for the motors. We shall have tracks radiating northward, southward, eastward, westward. Thousands of cars will pass daily upon these, and at night the beauty of the scene will rival all description. As for the railways, the electric trams, the motor omnibuses—they are doomed beyond any hope. Each man will be a traction company unto himself, and the



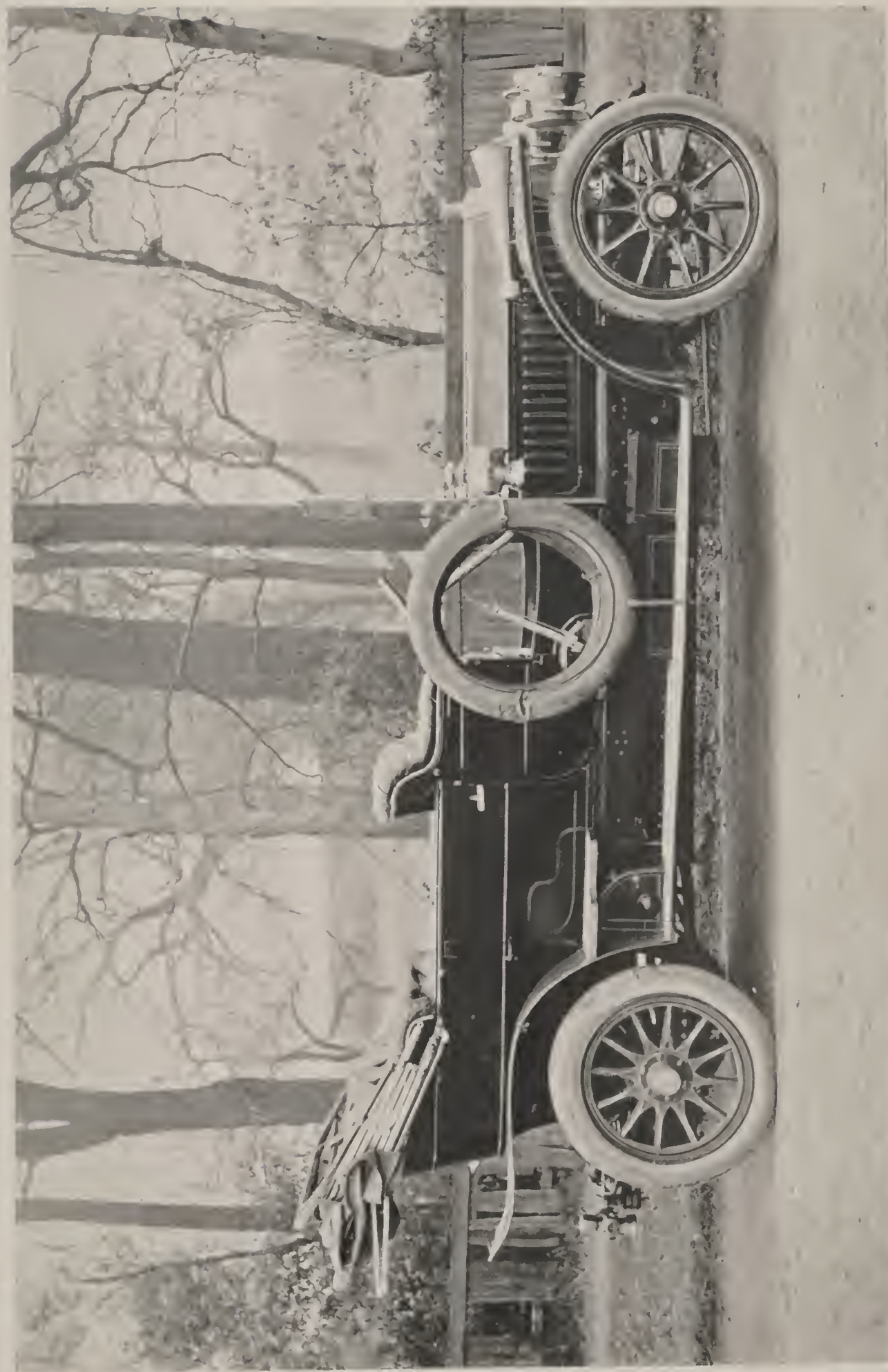
difficulties of travel will be at an end. The thing must come, says our cherry optimist. Sooner or later it is bound to be—as inevitably as the rising of the sun in the sky or the glory of the moon upon the waters.

Our manufacturing prophet is no less emphatic, if his optimism strikes a different key. Here is the man who will take you into the corner and tell you an obvious truth: that every vehicle now upon the road, the cart and the carriage, the van and the lorry, the phaeton and the dog-cart, the duchess's coach and the costermonger's barrow—that these eventually must be propelled by mechanical means. The horse we lead immediately to the Zoological Gardens, where he shall be dealt with internally and externally according to the needs of the moment. Possibly a couple of specimens will be kept to show the “beast who was”; but he, as Benn Gunn remarked upon a solemn occasion, is already as good as salt pork where the traffic problem is concerned.

And so our friend proceeds to erect his monument more lasting than brass and of better metal. What fortunes must be made, not by one, but by a hundred houses! How numberless will be the multi-millionaires who must arise! And how many other trades will benefit, and, in turn, endow their millionaires! Merchants in steel and builders of bodies; workers in brass and workers in copper; jobbers in the veriest trifles necessary to the adornment of the carriage; wheelwrights and makers of tyres—you could name a hundred trades that will ultimately participate in this overwhelming prosperity and rebuild the country's fortunes upon it. Let it be said in justice that this picture is not impossible; it is merely premature. Such a change will come to be. I doubt not that every vehicle will ultimately be mechanically driven as our good friend says. We shall eventually banish the horse from our streets; but the day of his final disappearance will be seen by none now living—for those who talk in this way remember little of the story of their country and less of an Englishman's characteristics. They are speaking wholly as mechanical experts.

We are a “horsey” people, and we glory in the accusation.





*Photo by Campbell-Gray.*

*The Six-cylinder Napier ready for Touring.*



The greatest pageants in our story are pageants which the horse has made possible ; our truest romance is rightly concerned with the "faithful steed." Reflect how to this day fox-hunting remains the king of all sports in the imagination of the people. Visit Epsom Downs upon Derby Day, and ask what the majority of the vast congregation there thinks of the motor-car. Discuss this great subject in any club circle, and note the poverty of the enthusiasm which the motor inspires. These are facts it would be more than foolish to disguise. There is nothing, be sure, in this universal substitution that is desired by the populace. The world will be no better ; it will probably be a great deal less comfortable when mechanical traction is universal. This the far-seeing motorist does not disguise from himself. The pleasures of his pastime are in some measure the outcome of its limitations. When every high road is alive with cars, when there is a ceaseless roaring of exhausts and blowing of horns, when the railways are almost forgotten and the reign of the car is undisputed, then I venture to question if pleasure will have any say in the matter at all.

Happily the day for all this is, in my opinion, far distant. I see no revolution at hand. I do not believe that either this generation or the next will witness the extinction of the noble quadruped or the universality of the motor. Such evolution must be as slow as evolution ever is. There will be ups and downs, progression and retrogression ; years when it will appear as though the motor movement had reached its goal ; years when it will be carried on with amazing vitality. But all this has little to do with the Motorist of To-morrow. He, I take it, must be much as the Motorist of To-day. It is impossible to believe that any overwhelming revelation awaits him in the gospel of the motor-car. We know, I venture to think, exactly what we have to expect ; we are not likely to be the satisfied victims of surprise.

Nor is this to say that improvement will not be swift to come. The dreamer looks with some justice to the electric car for our final redemption. A believer, of course, in the phantasmagoric accumulator which Edison has not invented,



hoping day by day that America will be justified in her splendid boasts, telling himself that we have only to discover a battery to banish petrol from the world—here is a sleeper who is never awakened, and upon whom irony is wasted. It is vain to assure him that the chances against this all-conquering electricity are many thousands to one; that whatever else science may do, she is not at all likely to find us accumulators which will make good the inherent defects in all cars driven by electricity. No scientific miracle, indeed, promises to astound the Motorist of To-morrow. He may be able to run an electric car fifty miles where now he can run it twenty. The fact would be of no consequence, for all the fundamental drawbacks would remain. There would be the old trouble about charging-stations; the absurd limitations of speed; the nuisance of accumulator-changing; the cost and worry of it all. At the best the electric carriage is perfect for the city; at the worst it is for the scrap-heap.

So our sceptic will pay but little attention to Mr. Edison, and less to the trumpet-blasts which herald the accumulator and accumulating puffs. If he hopes something from the steam car, it is with a timorous expectation for which time does little. The petrol car is king of the road to-day; there are no facts which lead us to the belief that it will not be king of the road to-morrow. Possibly—and this is a deep problem—petrol will lead electricity to the altar, and there swear both obedience and servitude. We have been led to anticipate something of this kind by the recent appearance of the *Mercédès Mixte Car* and the many striking characteristics it possesses. But the day is not yet for the expression of an opinion, nor would such an alliance be disastrous to the argument.

The Motorist of To-morrow will not, I think, care very much about speed. The days of the “sixty-mile-an-hourer” are over upon the British highroad. Even the speed maniac is quickly tamed nowadays; while the sane man has come to see that thirty miles an hour is the comfortable gait, and that anything more, if persisted in, is but a short cut to suicide.



All this leads to moderate driving and to moderate demands. We desire to see the country, and have discovered that we cannot see it when we are travelling at forty miles an hour. We wish to make our journey in comfort, and find that there is no comfort in the rush and roar of the monster car. We have learnt that the truest pleasures of motoring are those of independence, of rest, and of God's fresh air. The early days, with all their revelations of the autocar's possibility, naturally led us to some just excesses; but we no longer regard it as a wonderful thing to drive a car even at seventy miles an hour upon a highroad. It is merely foolish, and, while we so name it, the perils of the proceeding are no longer hidden from us.

To travel in comfort, then, and to travel discreetly! This will be the ambition of the Motorist of To-morrow. But he will also desire to travel without delay, and to this end the manufacturer is helping him. Every car built will be driven upon detachable rims before a couple of years have passed. No longer shall we await those moments of anxiety when the town of our desire is but twenty minutes distant and the back wheel tyre is sagging in its rim; no longer shall we stand and quote Socrates upon the highway when the guns have started for the covers and we have "burst." The detachable rim—capable of being fitted in something less than a minute—will put an end to all this. The Motorist of To-morrow will laugh when he reads of what the Motorist of To-day has suffered from punctures.

"Why," he will say, "the thing was an antiquity—you could not even depend upon it to catch a train." And he, of course, will give no thought to tyres except to pay the bills. Forks and levers and patent hooks will not be found in his tool-bag. He will change a rim before his guest can finish the cigarette he has lighted. This may be a blessing—or it may be a curse. It would depend, as the Irishman said, "whether it was the one lady or both av them who were in the car with you."

We shall possess engines as flexible as human ingenuity can make them; we shall be driven in silence, and discreetly;

we shall start our cars from the driver's seat; but above all we shall have comfortable carriages. Here is the keynote for the Motorist of To-morrow. In the prehistoric days of the motor industry our "bodies" were the last things we thought of. Faithful to the apostolic tradition, we mortified the flesh and gloried in it. Two miserable seats in front, a bit of a tub behind—this was our motor body. No one seemed to think of comfort or to demand it. We squeezed the ladies into dismal corners and filled the intervening space with petrol cans. Even a Cape-cart hood was not known at that time. When men first began to cover their cars, the devices were crude beyond all imagination. Ridiculous canopies which rattled like dice-boxes, miserable canvas hoods resembling nothing so much as the wigwams of the savages—these were thought almost feminine in their luxury. It was odd that it should have been so when we remember that the very first carriages shown at an Automobile Exhibition in England were in a large part imitations of the broughams and victorias of our own time.

Here is something I have never been able to understand. When a motor-car was first designed it was designed as a horseless carriage. I can recollect fine victorias with John perched high upon a box and a great wheel before him; there were broughams built exactly as the broughams we know, and yet as unsuitable for motoring as the mind of man could conceive. And from this crudity we passed in an instant to the other extreme, and little Panhards came over to us with bodies that you must have a telescope to discover. We sat upon quasi packing-cases and thought them fauteuils; we breasted the sun and the rain, the hail and the snow, and gloried in our martyrdom. So far as the body of a motor-car was concerned we began literally *de novo*, building up stage by stage from the miserable tonneau of 1897 to the Roi des Belges of 1902. Then, at last, some one suggested the landaulette, and, upon that, the limousine was named. And so, step by step, to the luxurious carriages of our own time and all the comfort they bring with them.

I have never altered my opinion that finality has not yet

been reached in this matter, and that our carriage-builders will have much to say to the Motorist of To-morrow. It is all very well to box us up in a landaulette or limousine, but fresh air is the first requirement of the motorist ; and little of that he gets in either contrivance. Justly desiring to be master of his own car, he will not drive the landaulette, while he drives the limousine reluctantly. And here the coach-builder must be his ally. We shall have bodies which will give us as much comfort as the limousine and as much fresh air as the phaeton. Something of the kind has already been done, and excellently well done, by Kellner of Paris. There is the "All-Weather-Quick-Change-Body" by Mullet of Bristol to show the trend of things. Either of these carriages could be driven by an amateur and driven with credit. They give us perfect protection in all weathers ; they furnish us with an absolutely open car when we so desire it. And these are the demands of the well-schooled to-day. They will be the universal demands to-morrow.

Let me not forget the small car and all that will be done for the man of moderate means even in the immediate future. Upon this I shall have much to say in a special chapter devoted to the small cars of the day. But it is clear that the little vehicle, at a price of somewhere about £100, is to play a great part in the motor story, and to play it bravely. Such a car will take the place both of the motor-bicycle and of the tricar. Of this I have no doubt at all : but it will do more, for it will redeem the industry from the cheap sneers so often aimed at it and bring the motor indeed to the homes of the people.

In this our greatest hope lies—that this movement shall be principally national, and that the Motorist of To-morrow shall be drawn from all classes of the community.



## CHAPTER III

### THE PURCHASE OF A CAR

THERE is a ripple on the face of the waters and the family stands upon the bank watching it expectantly. Some one has been telling "Pa" about motor-cars ; and "Pa" is making inquiries. Perhaps it was that young dare-devil Jones who picked "Pa" up at a funeral and drove him home with race glasses about his shoulder. Perhaps it was the family physician who is treating "Pa" for an excess of adipose tissue and has recently purchased a doctor's car. In any case, the waters are stirred and a storm is brewing.

It is really very interesting to trace these first beginnings and to follow them until they culminate in the acquisition of the car. How do people come to buy motors ? By what psychological process do they rid themselves, often instantaneously, of the prejudices of years ? Looking about me in a neighbourhood abounding with motor-cars, I find a ready solution to these simple problems. Like cures like, but it also produces like. We evolve after the eternal laws. Of those who become motorists, nine-tenths do so because a motorist has shown them the way. The remaining tenth is composed of mere observers. These men have read much about the motor-car ; they are mechanical ferrets ; they have bought the technical Press ; possibly they have read the novels of Mr. and Mrs. Williamson and the stirring romances of Mr. Le Queux. And one day comes the idea—why should I not be even as these ?

In a common way, however, the gospel is preached from the dashboard. The motorist makes the motorist. His is not a selfish pastime. He delights to have his friends by his side or to tuck them away in the tonneau behind.

Possibly a little pleasant vanity helps his hospitality. He must show Jones how he can drive, and let Smith see what a capital car he possesses. So Jones he hoists to a bucket seat, and Smith, begoggled and in undyed wool, is deposited in the tonneau behind. Here you see a proud owner in his proudest moment. What odds if a subsequent appearance is at the Police Court? The man has had his five pounds worth; he has also converted Jones, but left Smith, it may be, unmoved.

And here I may remark in parenthesis that these missionary efforts are not without their dangers. The old driver, accustomed to the high speeds of a motor-car, perfectly acquainted both with its possibilities and its limitations, too often assumes a similar knowledge on the neophyte's part and is astounded to discover that he is mistaken. This is a woeful assumption, and pregnant of mischief. People who have been accustomed all their lives to jog along in dog-carts or sedate broughams are unhappy enough at the best when first they motor. Not a month ago I was asked by an old friend, who is a sportsman to his finger-tips, to drive him down to his links just to see how he liked the business. This was a man who had done most things that men do—an old cyclist, a shot, a horseman, an oar; and yet he had not been in the car two minutes before the truth was out.

We were running along an open road, perhaps at a speed of twenty miles an hour. Before us there was the merest suspicion of a dip—a gradient, it may be, of one in a hundred—imperceptible almost to me, but terrifying to my friend. "Look out here," he said, "you're going down hill." I perceived the situation in a glance. London had played the deuce with a good sportsman's nerves. My friend sat almost paralysed in the "bucket" at my side, his hands grasping the cushions convulsively, his face deadly pale. Quite unused to any speed beyond that of a fast trotting horse, even twenty miles an hour could do this mischief. Had no consideration been shown to him, no pains been taken to assuage his fears, he would have been lost to motoring for

ever. For my own part I have a settled method to meet such cases, and this rarely fails me. Show the nervous man (or woman) how quickly your car can be stopped; let him (or her) see with what precision it can be steered, and half the troubles are over. I pointed out to my friend, upon this occasion, that no hill, whatever it might be, could present any difficulty to a car which was carefully driven, and whose brakes were in good order. To bring the fact home to him, I stopped my own car within a yard without any strain or stress whatever. For the next ten minutes or quarter of an hour we were not driving more than fifteen miles an hour—but the day was still young when my friend would have been quite content to go at forty!

Here were the beginning of things as they concerned one motorist at any rate. The man who clutched the cushions with convulsive hands is now the possessor of a Weigel car capable of doing sixty miles an hour or more, and is as enthusiastic a motorist as any in London. Had he been rashly or inconsiderately driven upon his first venture, I doubt not that he would have been lost to us for ever. And so I say that while motorists make motorists they may also unmake them, and that the ripple on the face of the waters may die away before even those upon the shore are conscious that there is a breeze.

But we will assume that it does not die away, that the family gathered upon the bank is rewarded for its patience, and that one day "Pa" returns triumphantly to say that he has bought a motor-car. Possibly—and there is every chance of this—"Pa" has also bought a "wrong 'un." A friend who is a crank, or an agent who is a rogue, has lunched "Pa" at the club, and planted an old car upon him. This is an assumption I make with reluctance; but, none the less, made it must be. All over the country at this very moment there will be families hoping for the day when "Pa" shall be converted. Some of these, even if the number be very small, will be the victims of the rogue or the adventurer. It is in the hope of reducing that number considerably that I am led to write this chapter upon the Purchase of a Car.



You want a motor-car, and you want a good one. If you have an expert friend it is the most natural thing in the world that you should first go to him for advice; but, remember, this expert may have an axe to grind. The very fact that he is an expert may mean that he is interested in the sale of some particular car, and that not necessarily the best car for your purpose. I do not say that the man is dishonest—*les affaires sont les affaires*. If it is a living to this fellow to push the wares of a particular maker, few will quarrel with him because he does so. But you have no interest whatever in that maker; his car may be not one for a family or a beginner—it may not, in short, be your car.

Let us, then, start with the assumption that you know nothing whatever about motors, have no experience and no views. How shall you be guided? Who shall be your philosopher and friend? My answer is that in such a case you cannot do better than buy a car from a maker whose reputation is world-wide, whose wares are universally applauded.

It would be insidious for me, and I shall make no attempt, to name one such maker before others, and to say he is your man. You will even as a novice have heard many names; you will know that certain cars, whatever may be the connoisseur's nice verdict upon them, are absolutely reliable as family carriages. Just take up a copy of any technical paper, and read the advertisements of such firms as Napier, Crossley, Daimler, Panhard, Charron, Renault, Mercédès, Mors, Humber, Swift, Lanchester, De Dion—these and a dozen more at least. I say that you could do little wrong should you visit their factories. Their names are a guarantee both of fair treatment and of honest work. Above all others the novice should rely upon such reputations, upon such a prestige, and listen to no man who would detract from them. The individual view is often prejudiced by many outside considerations. I may think—as I do—that the 20-h.p. Renault is the finest motor-car for its horsepower ever built; I may regard the later Charrons as perfect

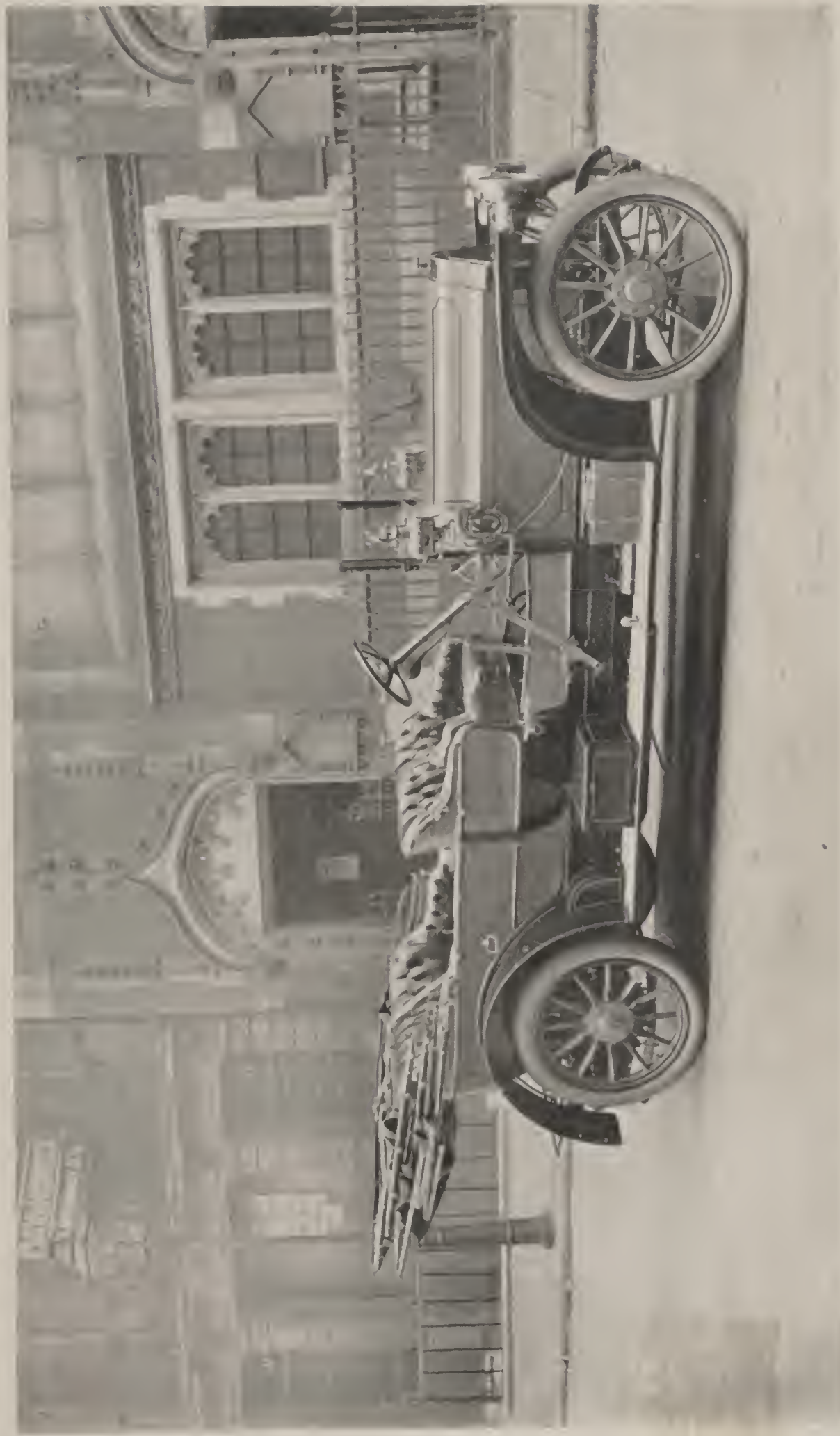
family carriages ; I may hold that the little De Dions and the little Swifts are the finest small cars built to-day. These, after all, are but an individual's opinion. The novice is safe with any maker of reputation.

I will assume, then, that your choice of car is determined ; that either upon the advice of a friend or of your own judgment you have decided to patronise some well-known maker, and to sample his goods. Now arises a far more important question. Of what horse-power shall your car be—of what nature generally ?

To answer this question I must know precisely what the needs are. Is it to be a carriage in place of the brougham your wife is now driving ? Or, upon the other hand, do you mean to become a motorist yourself—to drive the car continually and to make it your hobby ? Here are vital questions.

If a substitute for the brougham be desired, you must take a different standpoint altogether. You, as an amateur, will certainly not wish to drive your own landaulette ; and so your capacity is not in the balance. Any good chassis of 20 h.p. will satisfy the family requirements when a pretty landaulette body is built upon it. There are even little landaulettes and limousines of 14 and 15 h.p. running about town and giving their owners every satisfaction. Should the carriage not be desired for touring, excessive horse-power is distinctly a drawback. Should touring be contemplated, then I venture to suggest that both landaulettes and limousines are out of the question altogether.

This is somewhat a bold statement to make in view of modern practice ; and yet I make it unhesitatingly. The pleasures of motoring are the pleasures of the open air. An open motor-car enables you to see the country as you can never see it in a train, on a bicycle, or afoot. The splendid exhilaration of speed in the open air has, above all else, established the motor-car in the affections of the people. If we are to lose this, if we are to box ourselves up in stuffy limousines, then, I say, we are better off in any train, even the meanest, and will eventually go by train



*Photo by Argent Archer.*

The 60-h.p. De Dietrich.





wherever a railway company permits us. From France the new and evil thing has come. Hostile as ever to the air we breathe, given to stuffy atmospheres and delighting in them, who shall wonder that the Frenchman turns to the limousine with joy and has closed every window wherever a window stood open? This man can know nothing now of the pleasures of motor touring. He is hurled about like an express trunk and, deservedly, treated with as little consideration.

So I am a relenting opponent of the limousine where motor touring is concerned. I believe in the open car for the amateur; but in the car which can be closed should occasion and the weather arise. Let the man or woman who means to drive himself or herself order an open car to begin with, and see that such a car can be closed at will. Of this I shall have more to say when writing of motor bodies. The chassis is the first consideration—the size of it, the kind of it, and the horse-power by which it is driven. What is the correct horse-power for the beginner? This, truly, is a vital question. His whole future as a motorist may depend upon it, his enthusiasm will respond instantly to success or failure in this vital matter.

In the old days it was a maxim that a man must begin his motoring career, if possible, upon a motor-bicycle; that he must proceed from that to a single-cylinder car of some 6 h.p., and so train himself, stage by stage, until he arrived at the mastery which could control the monster. Our modern engines permit us to dispense with much of this preliminary coaching, and to pass our "general" examination, as it were, at an early stage in the academic career. The modern engine is so kindly and so flexible, its qualities and its failings are so well known, that the preliminaries may be well shortened and the beginner set in a four-cylinder car without any hesitation whatever.

Remember that ten years ago expert and novice were alike experimentalists. None of us then knew very much about the petrol engine; the wisest were often more foolish than the ignorant. We were working with a new power and

a power we had not yet learnt to control. Reliability was far from being a feature of the motor even of 1902. But we have changed all that. The modern engine is simplicity itself. It is quite possible to teach an amateur in a month that which the pioneers were a year in learning. The man who buys a modern car and is well coached by an old driver, who is at the pains to master the first principles of his engine, who takes a pride in its sweet running, and puts himself to some trouble in the choice of a driver to assist him—this man will do well enough on the four-cylinder car and will never regret his purchase.

Let him begin with something under 20 h.p.—I know of nothing better than a 14 to 20-h.p. Renault, a 15-h.p. Fiat, a 14 to 16-h.p. Argyll, one of the smaller Charrons, or even our old friend the 15-h.p. Panhard. These cars are speedy, but never dangerously so. They are easy to control—as are all modern cars of any worth at all. They will give satisfaction.

A car of medium horse-power, then—a four-cylinder car and one which will cost a sum between £400 and £600. Such are my ideas for the beginner. Even if he have motoring ambitions he will do well to curb them until he has graduated in these lower schools.

A few years ago in Paris I was called out of my hotel one morning by a young American who had just purchased a 40-h.p. Mercédès. He asked me what I thought of it. When I expressed my admiration he went on to tell me that this was the first car he had owned and that he intended to drive it himself. I asked him, naturally enough, if he had been taught to drive, and heard with surprise that he had had two lessons on an old 10-h.p. Panhard. These, whatever they were, had taught the young man but little. He attempted to start the car upon the fourth speed; and when it burked, he complained to me that Mr. Vanderbilt always started his Mercédès on the fourth speed, and that the agents had swindled him. In my turn, I pointed out that he must have misunderstood what Mr. Vanderbilt had done; and so, upon this, he condescended to put the car



into the first speed, and shortly afterwards disappeared in the direction of the Place Vendôme. Ten minutes later his car was a wreck in the Champs Elysées—a month from that date he himself lay dead upon the road to Chartres, and his young wife was one of the victims of the tragedy.

An ancient story, but not to be forgotten. This poor fellow knew nothing of the perils of high speeds or of the control of a car when driven at them. He had attempted to take a corner at forty miles an hour, had skidded badly and struck a tree. Even such an old driver as Count Zborowski was killed, as we remember, in the south, because he changed from a 40-h.p. Mercédès to a 60-h.p., and did not appreciate the tremendous capacities of the newer car. Such facts cannot be without their lessons to any prudent beginner. Moderation, and upon that moderation. Here lies the road to the finest driving.

## CHAPTER IV

### IN FAVOUR OF THE AMATEUR DRIVER

THOSE who have been much upon the road during the past few months give promising accounts of the amateur driver. They report much both of "him" and of "her." All the wise-heads who told us that the domination of the chauffeur must become universal are being derided by events. The amateur driver has not disappeared—far from it, "he" or "she" is an increasing quantity. The number of those who drive their own cars grows larger every day. Even nervous men are being persuaded; they are discovering how simple a thing it is to drive their own car, and how pleasurable. And all this must be held to be very good for the industry.

I have always hoped that we should arrive at such a state of things, and cannot but feel a large gratification that it is so. It may be true, as some of the wiseacres used to say, that there is nothing much in driving a car; but here we are faced by a question of temperament and can enter upon no profitable argument. If a man have not the road habit, if the delights of the high road are unknown to him, then there is nothing in motor driving. You might as well ask a long-shoreman, who is sick at Gravesend, to set up a yacht as an inveterate "first-floor hoteller" to drive a Mercédès two hundred miles. This man may have other pleasures, other sports, but he will never be converted to the road habit. His idea of travel is a stuffy train with a pile of newspapers, closed windows, and plenty of smuts upon his nose; possibly he dislikes fresh air; he is the kind of man who complains of "those d——d nightingales."

So we shall leave this person entirely out of the question.

There are many others, however, who are beginning to perceive how much they lose by permitting a hireling to drive their cars. Why, driving for some of us is half the pleasure of the business. By driving alone do we cultivate a sympathy for our engine, a response to its complaints and a mutual rejoicing. Driving braces our nerves, clears our eyes, stimulates our faculties. Those who prate of the laziness of motoring have surely never driven a car even a hundred miles. Let them do so and they will sing another song. I can assure them that they will want no other exercise upon that day at any rate.

Let it be clearly understood that the mere driving of a motor is not a difficult business. I am often told by those who do not drive that they have not sufficient nerve, a ridiculous plea when we remember how quickly the control of a car is learnt, and how absolute it is. Of course, I am not going to say that every man will make a competent driver of a racing machine. Here nerve is required, and nerve of the finest quality; but just to drive a touring car at a reasonable speed on the King's high road, to become master of it and to understand its humours, is a task of the simplest. I would guarantee to teach the so-called art to any man, sound in wind and limb, within a week. The second lesson should find any capable person already taking pleasure in the pursuit.

These are plain truths, but there are others not so obvious. Just as two men may drive the same horse, and one make a sheep and the other a devil of him, so two men may drive the same car, and one make a crock and the other a perfect instrument of it. Even in the year 1907 one saw some wicked driving upon the road. Men with absolutely no knowledge of the first principles of motor mechanics were rioting abroad upon excellent cars, maiming them, destroying them, doing anything but discover their qualities. This seems to say that the drivers in question have never been taught by a man who knows his business. Possibly they are the victims of some school or other. They paid so many guineas for so many lessons, and the instructor "saw 'em through quick." They



were taught how to put the gears in, how to steer, how to stop the car. "Shove this 'ere in and then let go of that 'ere pedal," was an elegant phrase I heard myself in Hampstead not a week ago. It was spoken to a car-load of young men who had evidently paid some guineas to the orator in question. I am sure they were impressed, and the way they "shoved that 'ere in" could have been heard across the Heath.

Undoubtedly the best way to learn motor driving is to take a preliminary course of observation. If such a thing be possible, let the novice ride as far as he can by the side of some old and experienced driver. Before he does this he will have read the subject up as far as it may be read in books, and become acquainted at least with first principles. He will not need to qualify as a motor engineer before he embarks upon this venture; but he should very clearly understand elementary principles, and he should know what happens. This will enable him to appreciate what the great driver is doing: he will understand the cleverness with which the gears are changed; the nicety with which the engine is nursed, the absence of stress and strain, the willingness and sweetness of it all. As a second chapter in his course he might very well get up beside some ruffian from a garage, a banger-in of gears and a slammer-on of brakes; then he will be able to make profitable comparisons.

I would say that it should be worth just about a sackful of gold to any amateur driver who could persuade Mr. Charles Jarrott to take him for a run of fifty miles before he begins his own adventures. He would then understand how simple are the anxious axioms upon which good driving is based.

Nothing impresses me so much in the skill of these experts as their invariable caution, and the unfailing resolution with which they observe the rules of prudence. No dashing by cross roads, no neck-and-neck racing to take an opening which is doubtful, no cutting cyclists close or driving them into the gutter, no showing off in villages—but just a boat-like glide through different places, a perfect mastery always, and a sense of power which is splendid. Out in the open you may



*Photo by Campbell-Gray.*

Mr. Charles Jarrott.





be holding on with both hands if you are a timid person. There will be no danger, however; you need not even be afraid that you are going to heaven.

If he has these plain truths before him, the amateur will very quickly learn to master his car. Let me assure hundreds of excellent people, who are now being hurled about by wild chauffeurs, that motoring would have a new meaning for them if they began to drive themselves. The business is simplicity itself. Any man of intellect could become the master of his car within a week. If he be a prudent man, he will start upon a machine of low horse-power, but not necessarily of less than four cylinders; he will secure the best coach that he can, and for some while to come he will never attempt high speeds under any circumstances whatever. The idea that an unusual quality of nerve is required for this pursuit is, I repeat, entirely fallacious. A great literary worker said to me the other day that he was never too nervous to drive a motor-car. And he is a man who suffers constantly from nerves. I should have named him as the very last person in all London to think of taking up this splendid pastime.

## CHAPTER V

### A CHAPTER OF A B C<sup>1</sup>

**I**T is a moot point how much a man should know of a motor-engine before he learns to drive a motor-car.

For my part I would have him know much. "Comfort may flow from our ignorance," as Prior has told us ; but the suggestion of the ditch is too obvious to be passed by. It is perfectly clear that a man who knows something of the elementary principles of the motor-car will drive that car better than one who knows nothing. At the same time, it is absurd to pretend that your would-be driver should qualify as a quasi civil-engineer, and begin to prate to you of theories of rating and the mathematical values of compression. What we do demand is a simple understanding of the way in which the car is driven ; of the first principles of the petrol engine and a general if superficial knowledge of the machinery our beginner is to control.

Take a novice up to a motor-car, open the bonnet and ask him what he sees there. He will answer that he sees and smells a good deal. The engine itself will be to his untrained eye but a block, or two blocks, of cast iron ; he will tell you that he perceives a number of steel rods going up and down while a "thing-a-my-bob" is turning round, and a "what-do-you-call-'em" imitating it. Nothing strikes him as so complicated as this wonderful motor. He has not a dog's notion how it works. This is an extreme case ; but others will tell you boldly that it is run by oil—though how it is run they

<sup>1</sup> The motorist of experience will look with a kindly eye upon this restatement of our motorist's alphabet. Many letters tell me that there is a good excuse for its repetition even in the year 1907.

know no more than the dead. Clearly, we have a case for drastic treatment; and drastically we shall treat it.

Now, firstly, I should tell this novice a very few simple truths. And the first of these would be that the vapour of petrol is not only a highly inflammable but a very potent gas when subjected to compression and mixed with air. I should tell him that if you poured petrol into a dish and there lighted it, the result would be a flame of a vivid and volatile nature. On the other hand, should you procure some of this petrol, force it through a tiny jet or gather it up in a wick, should you, in short, vaporise it, collect this vapour and mix a certain proportion of air with it, then you have the elements of a powerful and explosive mixture. Compress this gas somehow, subject it to a force which it cannot escape, then ignite it, and the mischief is done. You have contrived a fine explosion; you have also contrived one which has great force behind it.

Now, let us look at those lumps of cast iron we call the cylinders of our car. They are hollow, of course, and are meant for the very compression of this vapour we have spoken of. In each separate cylinder there is a piston with a connecting-rod attached to the main driving shaft, to which a heavy fly-wheel gives regular rotation. When these pistons rise they naturally compress any gas there may be in the cylinder; when they descend by the force of the explosion of that gas, they drive your car. Here is the thing as one would tell it to a child; and yet I have often found that it is the only way in which the non-mechanical mind can be brought to reason.

We collect petrol vapour, then, and we contrive to get it into our cylinders. But how is that done? asks the novice. We answer him that it is done by the suction stroke of the piston itself. Take a penny squirt as an instance. When you draw the plunger back, water is sucked into the squirt; when you push it down the water is ejected. Just in the same way when your piston descends it sucks up the petrol vapour and imprisons it in the cast-iron block. And this brings us immediately to the consideration of the very heart



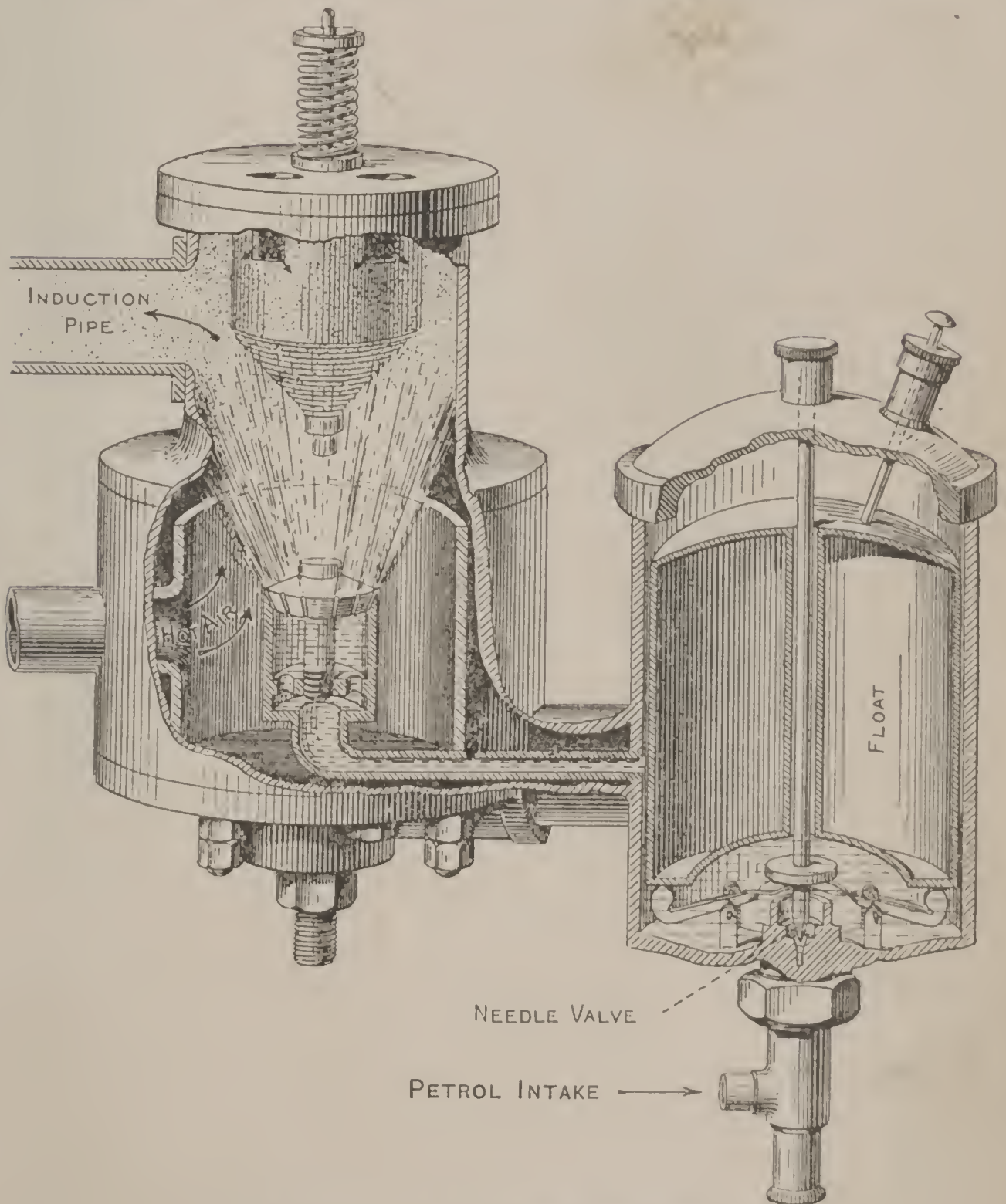
of the engine—that wonderful contrivance, the carburettor, of which you have heard so much.

It is all very well to say that petrol shall be sucked up by your pistons, but, believe me, the means by which this shall be done has puzzled our manufacturers for many years and is still far from a solved problem. When a motor-engine was first designed we simply had a square tank of petrol with a float fixed above the level of the liquid to break the vapour up. There were no jets, no mixing chambers, none of the paraphernalia we associate with the modern carburettor. Simple as the thing was, it served the old motor-bicycle better probably than any carburettor we have since known. But from the first it was obvious that we could not carry such a tank upon a motor-car ; or, if we could, that it would not serve us there.

So the wits of the motor-engineer were set to work, and he designed that wonderful little instrument which takes the petrol from your tank and sprays it, with added air, into your cylinders. Just look at the simple drawing of a carburettor which accompanies this chapter. Every motor which you examine will have some such contrivance, and you must know all about it at the very beginning. There is, you see, a little pipe leading from the tank where the petrol is kept to that round cup into which the petrol is to flow. The cup itself has a float which rises or falls when there is or is not petrol beneath it ; but more than this, you will see that the bottom of the chamber is shaped to admit a needle valve fitted through the centre of the float and so fixed to weights that when the petrol rises it closes the aperture and when the petrol sinks it opens it again. So you have the means of supplying your engine with a regular quantity of fuel ; and this is all-important.

We have now to see how the vapour of the petrol is gathered, and how the air is added to it. Look at the picture again, and observe that there is a tiny channel running from the float chamber to what is called the jet. This jet is not unlike a tiny gas-burner. It has a minute hole or holes through it, and the float in the other compartment is

so poised that the petrol can run to the top of this jet and no higher. This is what is called the mixing chamber. There is somewhere or other an aperture leading from it by which



A Simple Type of Automatic Carburettor.

air is introduced ; there is a second aperture fitted with a small piston which will respond to the suction of the engine, and, when that suction becomes very strong, add additional air to keep the mixture correct at all speeds.

This air, mingling with the vapour of petrol, forms the mixture which is to enter your cylinders, to be subjected to compression there, and then to be fired by an electric spark. So you see how it comes to be that the carburettor is the very heart of your machine ; how upon its nice adjustment the success of your engine depends ; and how, if you do not understand it, you will never be able to drive a motor-engine at all.

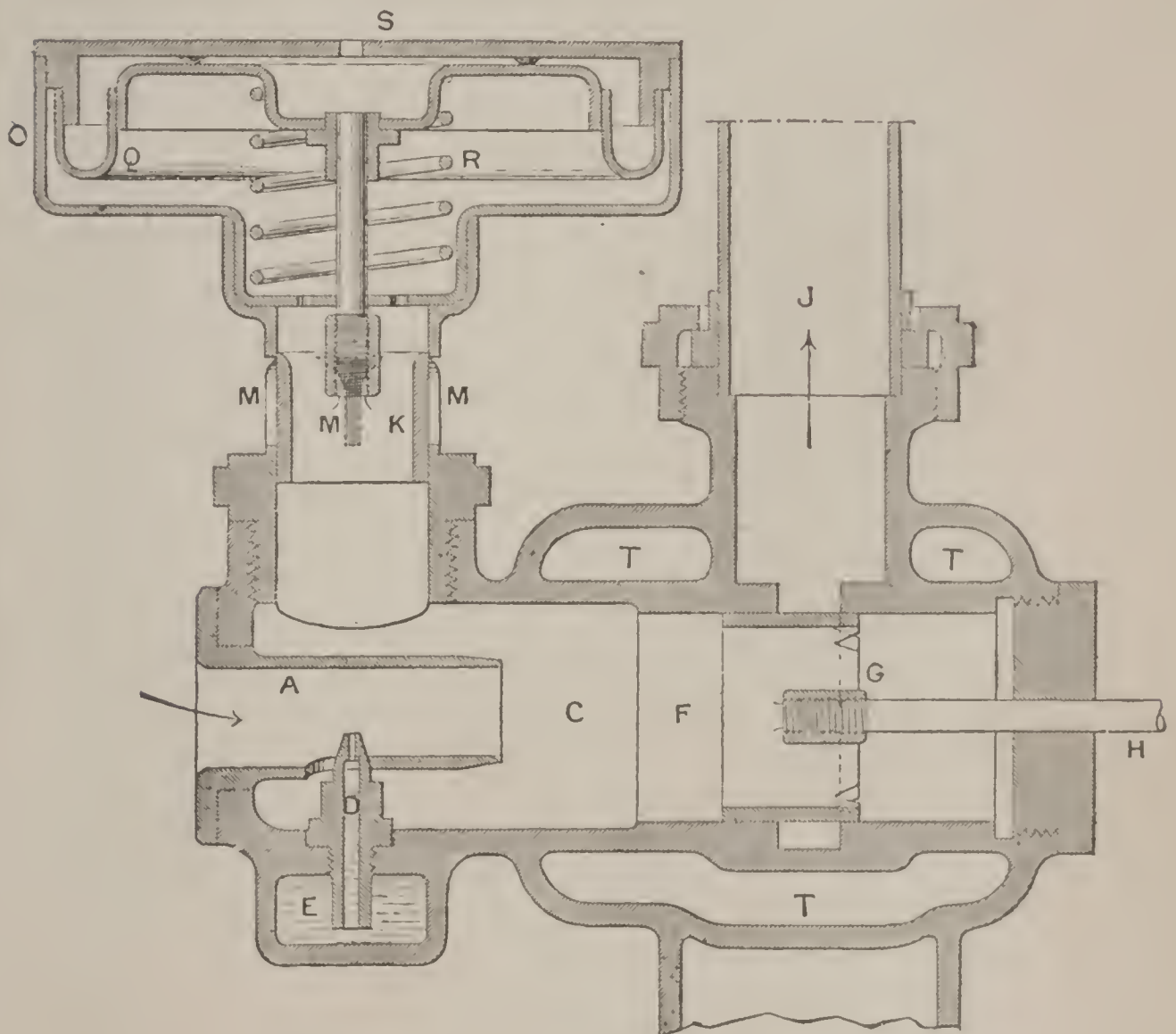
Here, then, are two things which the novice will see directly he opens the bonnet of a car. He will note the massive cylinders, the pipes that enter them, and the pipes by which the gas is driven out. Usually the pipe from the carburettor itself is plain enough, though he may often mix it up with the pipes for the cooling water. Upon the other side he will see the exhaust pipe, and will understand its functions. But the valves are still to be explained to him, as are the cooling system and the ignition by which the charge is exploded. Let us speak of the valves first : they rarely give trouble in a modern engine, but the novice would know little indeed if he did not understand something of them. What, then, are the functions of the valves as they concern our motor-engine ? Surely, they will be obvious by this time.

One of them, upon one side, admits the petrol vapour at the right moment for its compression ; another valve, upon the other side of your engine, permits the gases to escape when they have been so fired ; and these valves, you will see, are lifted and dropped in a most ingenious manner. The central shaft has a cog-wheel at the end of it ; into this wheel two other cog-wheels fit, each being bolted to a smaller shaft, upon which cams are cut. These secondary shafts revolve at half the speed of the crank shaft, and so their cams raise and drop each valve once while the engine shaft itself is revolving twice. This tells us immediately what is going on in our motor-engine, and what is meant by the Otto cycle.

Follow one of these pistons as we see it working. Firstly, it descends to the bottom of the cylinder, and while it descends the induction valve is open, and so the cylinder is



filled with gas ; this valve then closes. The piston rises and compresses the gas, at which moment the spark fires the mixture, and there is an explosion. Now the piston is driven down with force ; the exhaust valve on the other side opens



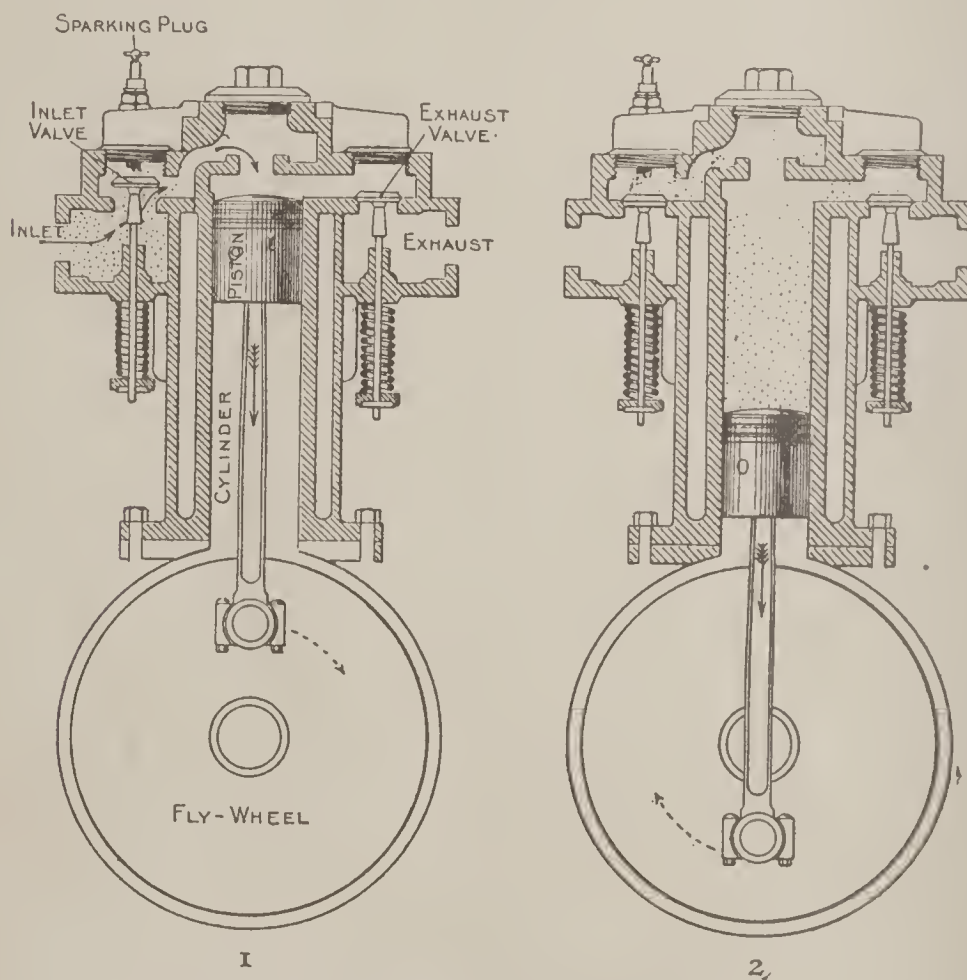
- |                     |                         |
|---------------------|-------------------------|
| A. Air Inlet.       | J. Gas Outlet.          |
| C. Jet Chamber.     | K. Diaphragm Piston.    |
| D. Jet.             | M. Automatic Air Inlet. |
| E. Inlet from Tank. | Q. Rubber Diaphragm.    |
| F. Gas Chamber.     | R. Diaphragm Spring.    |
| G. Throttle Piston. | S. Vacuum Hole.         |
| H. „ „ Rod.         | T. Hot Water Jacket.    |

The Krebs Carburettor.

as the piston rises again, and the burnt gases are discharged. Once only in every two revolutions of your crank shaft is there such an explosion in any one cylinder. That is why we have four or six cylinders in a modern motor-engine,

so that the drive shall be as nearly continuous as we can get it, and there shall be no unpleasant vibration.

When the beginner understands that the vapour of petrol drives his engine, that this vapour is delivered by a carburettor and admitted by valves to his cylinders, he must next learn how the compressed charge is fired and what we mean by "ignition." (I am devoting a special chapter to this later on.)



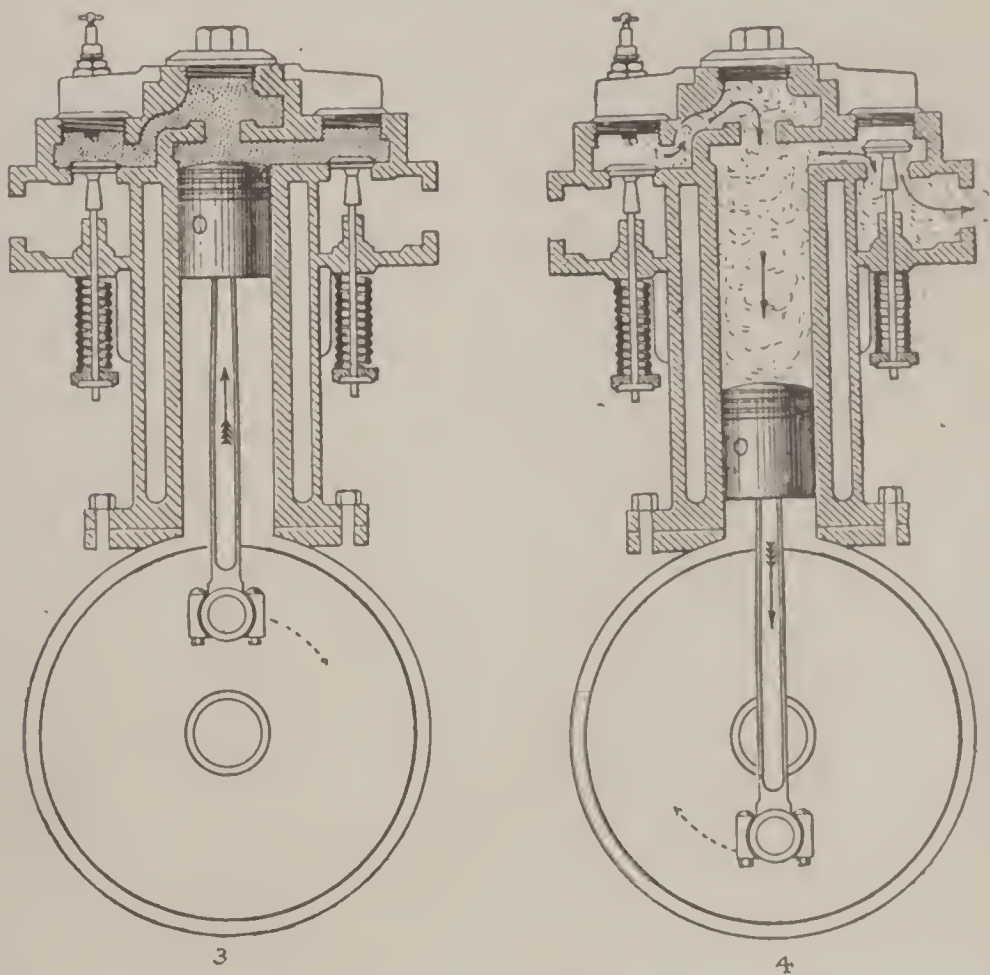
Simple Drawing to illustrate the Otto Cycle.

- (1) The Induction Valve is opening.
- (2) The Cylinder is filled with Gas.

So far as the first lessons go, it will be sufficient for the novice to know that a spark is produced in the cylinder at the moment when the piston is at the highest point, and that this spark fires the gases.

Obviously if the piston were travelling at a very high rate of speed, and we timed our spark always to take place at the same instant, then we should arrive at such a condition of affairs that the spark would sometimes be produced, not

when the piston was at its highest point, but almost at its lowest. So we must be able to vary the time of firing—that is, we must be able to produce the spark always when the piston is at its highest point; and to do this is the purpose of that little manette upon our steering-wheel, about which our instructor will have something to say. Before this, however, we may well understand that our accumulators or



Simple Drawing to illustrate the Otto Cycle.

- (3) The Gas is compressed and fired.
- (4) The Exhaust Valve opens.

batteries deliver current to the coil, and that this coil sends out a current of immensely increased voltage which creates the spark in the porcelain plugs in our cylinder heads. This, I think, is all we shall need to know when we take our earlier lessons in driving—that the spark is capable of variation, and that a clever driver must make this variation his closest study.

Just consider the thing from the A B C point of view.



When the piston is running slowly, the spark occurs absolutely at its highest point. Now, if you advanced the ignition and still ran your piston slowly, the spark would really occur before the piston had reached its highest point, and the result would be disaster. The crank shaft would be revolved violently in the opposite direction to that it should take. You would experience a back-fire, and if you were turning the starting-handle, might very well break your wrist as a contribution to the experiment.

Why then, say you, advance the ignition at all? I will tell you. Directly the number of crank-shaft revolutions increase, the piston as it were overtakes the spark, catches it up, and passes it if it be not advanced—in other words, the piston goes so fast that it reaches the top of its stroke and is half-way down again before any spark takes place. This means to say that all power is utterly lost. The gas expands before it is fired; the engine becomes entirely inefficient. So, directly the speed of our engine becomes considerable, we so set the sparking mechanism that the spark would seem to take place while the piston is making its upward stroke and at some millimetres before it reaches its highest point. That it does not actually do so is due to the speed of the engine. The piston races the spark and gets to the top of its stroke just in time to have the mixture fired under full compression. If the beginner understands this he will have taken a great step forward. It is necessary for him to understand it, that he may become a good driver.

What, then, of the other pipes we see, of the fan which revolves at such a high speed at the front of the engine, of the radiator with its almost countless little apertures—how do these affect the novice, and what must he know of them when he is about to take his first lesson in driving? I would say in answer that he need not dwell long upon such points. Obviously the radiator is to hold water and the water is to cool the engine. We can well imagine the enormous heat generated in the cylinders by the repeated explosions which take place. If there were no water-cooling we should expect our cylinders to become quite hot, and they would not

disappoint us. So we have a system of cooling them by water; and remembering that if the temperature of water be raised considerably, the hotter element rises, we endeavour—a centrifugal pump helping us—to force a continuous current of cold water about our cylinders, and thus to keep them cool—the draught from the fan helping the process.

With this the beginner is but little concerned. The care of the machinery must be in other hands for some time to come. He will merely desire to know the why and the wherefore as they affect him in the driver's seat. And so we lead him at once to that great question of transmission—the transmission of the power from the main crank-shaft of his engine to the road wheels at the rear of his car. In this he must immediately interest himself. His very reputation and success as a driver will depend upon his understanding of clutch and gear-box and differential. If he do not master them at the outset, he may never master them. Let him, then, devote a good hour at least to the examination of these under a competent instructor. The time is well spent indeed.

And firstly he will ask a question, Why, he will put it to us, should not the engine drive the road wheels direct? What is the necessity for all this fuss about a clutch and a gear-box and that amazingly clever contrivance, the differential? Here we must not answer him impatiently, for he is unconsciously putting questions which concern even the greatest of the experts in these later days.

Why have a clutch? The clutch, we tell him, is an invention by which, while leaving the engine still running, we can keep the car absolutely at rest. To do this we divide that which otherwise would be a continuous steel shaft between engine and wheels, and we fit up, inside the fly-wheel of the engine, a second and smaller disc with a leather face—and we so arrange this, by the aid of a squared shaft and a strong spring, that the two wheels can run as one or be separated, and either, or both, kept moving. This, the simplest and most ancient form of leather cone clutch, enables us to drive our car without getting down and restarting the

engine every time we have to pull up for a hansom cab. The motor-car in its present shape would be impossible without a clutch. We could not drive down our own street, perhaps, without restarting our engine two or three times. It is the supreme control of our transmission, and to learn to use it properly is one of the greatest of arts. As you put your clutch in or withdraw it by the aid of the pedal at your feet, so you allow the car to move on or to slow down. This the beginner will immediately apprehend.

But a second question of a like kind. Our novice will admit the clutch, perhaps, but his curiosity will not be wholly satisfied. Granted that such a thing is necessary—what, then, is the meaning of a gear-box, and why should all the troubles of gear-changing pester us? This is a more difficult matter to answer, where the beginner is concerned. It is not easy to explain to him that a petrol engine runs best at a certain number of revolutions a minute—some at eight or nine hundred, some even at twelve or fifteen hundred revolutions. Slow this engine down, and it will give comparatively little power. Unlike a steam engine, which can begin at a very crawl and advance with precision to a high rate of speed, the petrol engine must be turning fast to give out its full power.

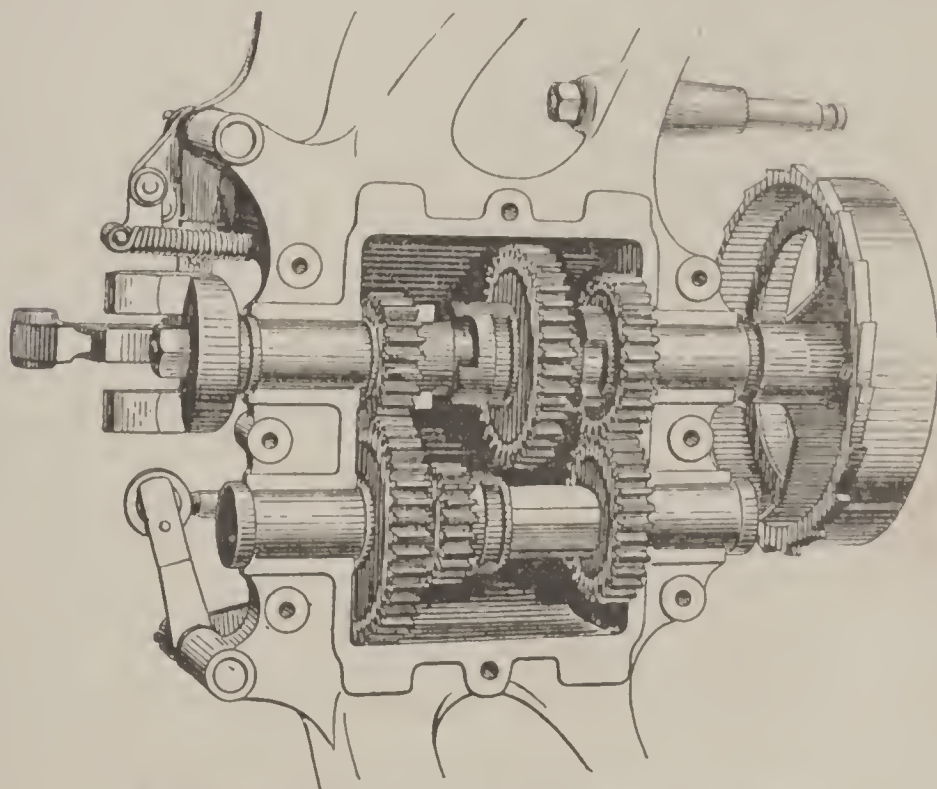
So our friend will see that if he did not possess a gear-box, which permits him to vary the ratio of his gear as between engine and road wheels, he would be in a poor way indeed. His car would have little flexibility. To enable the engine to start and to put out the necessary power, it would have to be geared down so low that high speeds would be impossible unless he had cylinders of enormous dimensions. And if he did not gear it down—why, then it would stop immediately he tried to start driving his car. The power would not be great enough to set the wheels running.

It comes to this briefly, that the crank-shaft of our engine is revolving much faster than the shaft which moves our driving wheels; and to enable us to keep our engine running at its highest efficiency, we contrive with the aid of the gear-box a series of ratios. Perhaps for the highest speed our engine-shaft will turn three times while our road wheels turn



once ; but for our very lowest speed, when we have to start the car from rest, our engine-shaft will turn twelve times while the road wheels are turning once, or, in other words, we create a leverage as of twelve to one in favour of the engine. This permits it to pick up a heavy load from rest, and to draw it away. Then we change the ratio by moving the lever at our side and put in a second, and so on, until we get upon the top speed, and are racing away merrily as fast as the local policeman will permit us.

How are these changes contrived? What is inside that

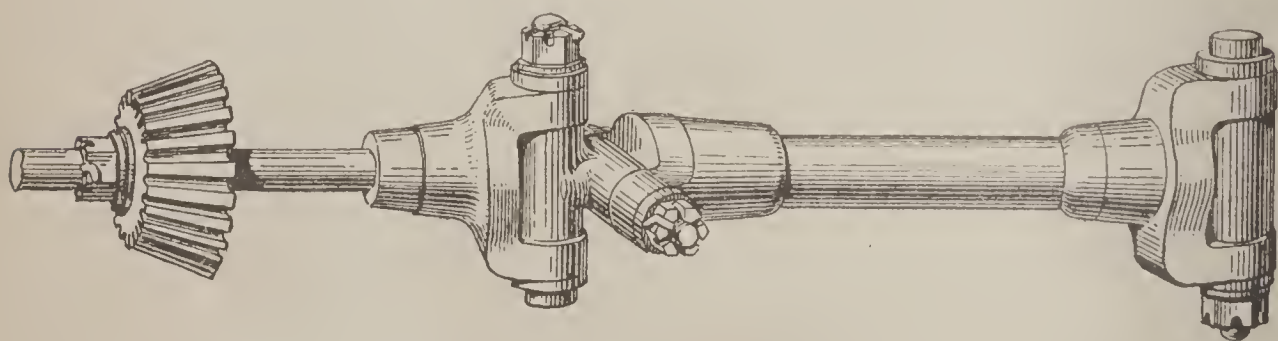


Half-perspective Drawing of the Argyl Gear-box.

great block of a gear-box, which the beginner regards with such awe? Let him take the lid off and see. "A number of cog-wheels," says he ; "some under others, or by their side, and two shafts carrying them." Precisely ; a number of cog-wheels which can be so moved upon a squared shaft that different pairs of them may be engaged and the different ratios secured. The change-speed lever at your side permits you to do this. A fork, you see, catches hold of the squared and movable part of the shaft and meshes the particular pair of wheels you wish to engage. So the main drive, running upon one shaft into the gear-box, may run out of it upon

a different shaft (though not always so) to your back wheels. When you interpose no intermediary wheels at all, then you will be upon the direct drive, giving you your highest speed, and causing the car to run with that beautiful smoothness characteristic of the modern machine. This, also, you must understand when taking your first lessons in driving. The correct use of the different gears is not always understood by men who have been at the wheel for years. As I have said, they depress "that 'ere pedal" and "shuv in that there lever." You can hear them quite a long way off.

We have now carried our drive from the crank-shaft of the engine to the gear-box ; but we must carry it on to the wheels at the rear. This may be done in one of two ways, speaking of broad systems. We can either drive our road wheels by



A Simple Form of Universal Joint.

side-chains, or we can drive them by what is known as the live axle. In the former case, our gear-box ends in a transverse shaft, which carries a chain-wheel at either end of it. These carry the chains which drive our road wheels, much as the chain of a bicycle drives its rear wheel. Should we prefer the live axle (and we are all coming to that), then we have a long propeller-shaft going straight to the differential box, and from that box the driving shafts are led to the road wheels. The illustration will make this system very clear to the beginner. He will have no difficulty in understanding that the long propeller-shaft must be jointed with what is known as a universal joint ; because if this were not introduced, there would be a terrible twisting strain upon the rod every time the chassis of the car was deflected by an obstruction in the road or any unusual torsion,

There are many forms of universal joint, but all are there to permit the frame of the car to move as it pleases, and yet to keep the propeller-shaft unmoved. I know no simpler way of stating the case. The universal joint is an affair the beginner can understand at a single glance; it is another matter altogether when we come to the differential. I have known even observant men perplexed beyond all reason by this.

What, then, of this wonderful differential? What is it for? Whence did it come? Is it indispensable to our car? The latter question first, if you please. Years ago when men were first experimenting with mechanical traction they discovered the necessity for this wonderful contrivance. I remember my own astonishment when first confronted with one of the old De Dion tricycles to which a differential was fitted. Why, you could turn either back wheel without turning the other, and yet they both drove the machine! A moment's thought, and the necessity of a differential is established beyond all possibility of doubt.

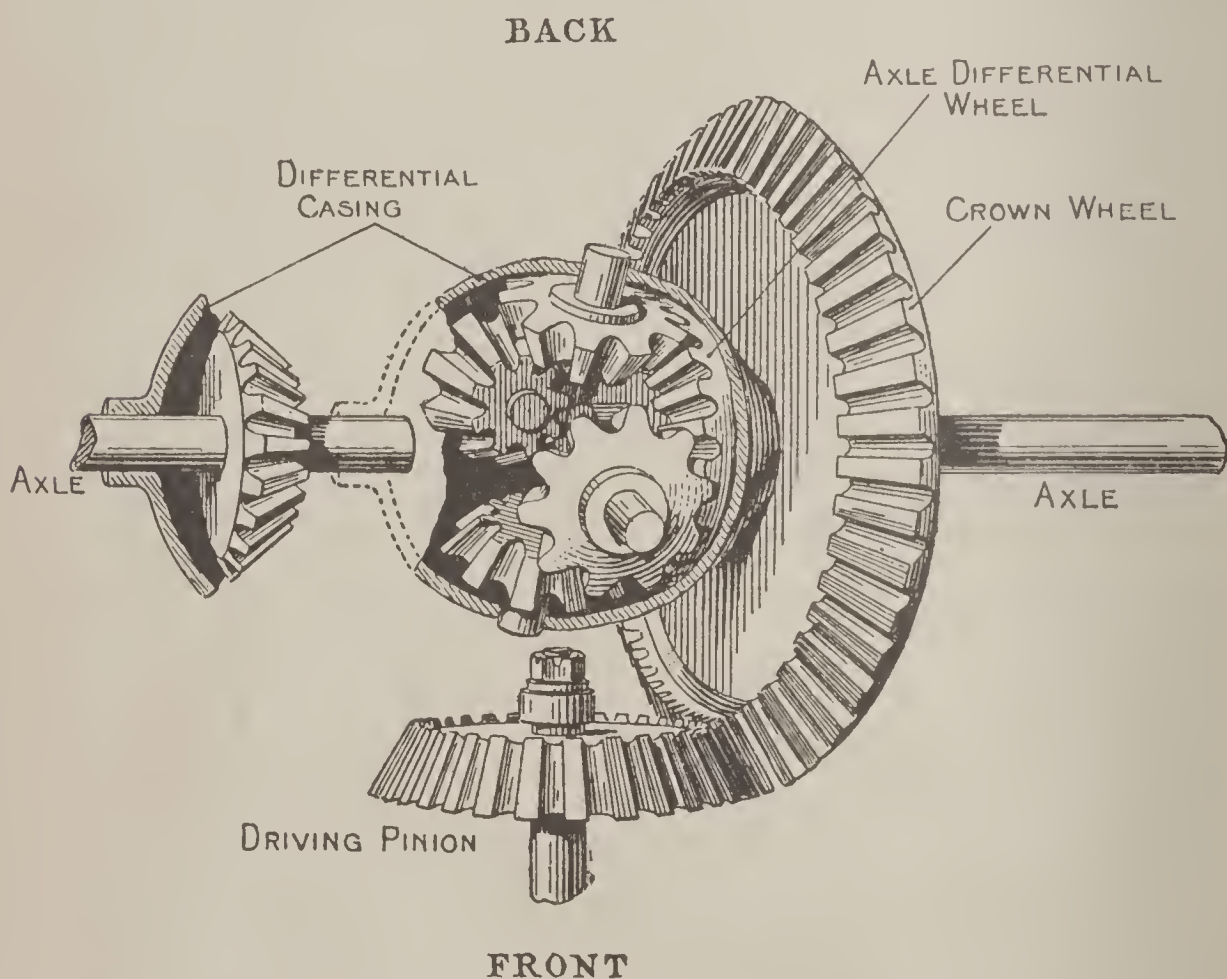
Consider what would happen if you employed a continuous back axle with a road wheel at either end of it. Directly you came to a corner, the outer wheel would wish to turn very fast, the inner wheel to stop. If the car did not skid violently, something would go. Your differential saves you from this. It permits one wheel to be turned and the other to remain stationary; and it does this by running each road wheel upon its own axle, and joining the two together in the centre by the aid of star wheels working on differential wheels attached to those axle-ends.

Take a pair of star wheels and mount them upon an axle; now fit this arrangement between the differential wheels, to each of which a road axle is fitted. If you pull upon the star axle, each of the differential wheels will be turned evenly and together. But suppose that you pull upon one road wheel and hold the other so that it cannot revolve! What will happen then? I will tell you. The star wheels will begin to turn upon their axles, and to run round the differential wheel; in other words, they will take up the unusual strain, and it will



not matter at all if one differential wheel turn a whole revolution while the other is absolutely stationary. In actual practice the star wheels do not move very much, except at a severe corner. But the modern motor-car would be impossible without them.

There is another form of differential in which cog-wheels are used. The beginner need not trouble about it, as the principle is exactly the same. If he understands this, we shall have



A Half-perspective Drawing of a Differential.

brought him from the engine to the road wheels, and he will have a glimmering of the mechanism of a modern motor-car. I say a glimmering, for more than this is not to be obtained from a book. A week upon the road will teach him more than all the hand-manuals that were ever written. None the less, he must read if he is to learn quickly ; and he may well return to the books when the first lessons have been taken.

One thing I would have him specially to study before sitting at the wheel of his car, and that is the brakes. He

will perceive that there are three brakes to his car—one of them operated by the pedal, which his right foot covers, the others by the long lever outside that other lever which changes his speeds. Of these, the first is a brake fitted to the driving shaft, where it emerges from the gear-box. There is a steel drum, inside which two iron shoes can be opened like a pair of scissors to grip the steel and prevent the shaft revolving. The other brakes are fitted upon the rear axles; they act in similar drums bolted to the wheel itself.

It is exceedingly important to understand the power necessary to stop a motor-car when it is travelling at a high rate of speed. You are arresting a force to be measured upon occasion by many tons, and you are arresting it through that delicate mechanism of the differential and the engine. Does not this immediately say that we should use our brakes with care, or, if we would become really great drivers, that we should use them hardly at all? We need not think too much of this when we are taking our first lessons, but afterwards, when we have obtained something like control of our car, then we must remember it constantly. The careful driver is also the economical driver; and the man who does not use his brakes wickedly will be much in pocket when Christmas comes.

## CHAPTER VI

### REMINISCENCE AND A LESSON

FEW men forget their first lesson upon a motor-car. I remember mine, as the novelists say, in my dreams. An old Panhard car was the vehicle chosen. The place was Bishop's Avenue at Hampstead. This used to be rural enough. There were high hedges to receive you upon either side—and no ditch to suggest unkindly things. I had ridden a good many miles upon a car before I attempted to steer one, and thought the business easy enough. But that Hector was soon changed. And there was humiliation in the process. Of course I knew the attitude the driver should strike, and took it with pride. Head slightly thrown back, hand upon the change-speed lever, one foot upon the clutch pedal—the other for the pedal brake. In some cars built nowadays you want five feet—but makers then remembered that you had but two and dealt with you with a text-book of anatomy in their hands. So I was not perplexed by a multitude of instruments, and when the Man who Knew started up the engine and took his seat beside me I felt that Charles Jarrott must look to his laurels and Henri Fournier tremble for his reputation.

“Let in the clutch gently,” said the Man who Knew. I obeyed him with a condescending nod; and imagining myself to be playing the first bars of “Home, Sweet Home” with the soft pedal down, I let in the clutch—and the engine stopped.

“Hallo,” cried I, remembering the motor manual, “do you think the petrol's turned on?”

He answered through his teeth as he ground the handle of that unmusical organ—“Plenty of petrol, but too heavy



a foot. Now try again—and for the lord's sake don't think you're treading on a scorpion."

I obeyed him with what knowledge I could command and the car flew up in the air as though a motor-'bus had smitten it from behind. This meant that I had let in the clutch with exemplary violence. We were going up the Avenue and the steering did not perplex me greatly. I kept a fairly straight course and tried to hear my philosopher while he told me to put her on the second.

"Take your clutch out—let the car run twenty yards—then slip in the second and let the clutch in with a firm foot. Good lord, you've stopped her again! Didn't you hear what I said?"

I told him that I had understood him perfectly. I was to take the engine out and put the lever into the pedal—which exasperated him beyond all reason.

"Now look at that—it's a pedal, ain't it? And look at this here. It's a lever, ain't it? Well, press down the first and move the second on. Do you take me?"

"If you will get in and the car can carry you," said I—but he was grinding at the engine again and his remarks were inaudible.

I got the "second" in that time with a clash as of subterranean wheels and a grinding of metals which caused the horses to shy. Now the car was going fairly fast—but she would do no better than the second upon the somewhat severe hill which leads up to the Spaniard's, and we arrived at the crest with but few of those graceful geometrical figures a beginner can trace upon the highway. At the summit I managed to turn the car round and we began again. But, remember, it was down-hill. And now she began to travel at some twenty miles an hour, I suppose. Who shall wonder if the soft fence attracted me as though the Promised Land lay beyond! I recollect a wild swerve, the car seeming to rock upon two wheels—then came a frantic effort upon the philosopher's part, a sudden remembrance of the brake and its purposes, and a providential halt upon the very brink of the green. The situation had been saved, but scarcely

with honour. The Man who Knew laughed a little forcibly. I remembered that a sorrowing widow might not have taken my view of the circumstance.

After all the moral was very simple. Why begin upon a hill? As well imitate the friend who started to motor between two ditches in Norfolk, and ended in the ditch upon the right-hand side. In the Johnsonian phrase, there is no necessity. A good broad road is the beginner's field. Let it be a flat road, and if possible bordered by a sward of grass. Here he may pirouette as he pleases. The first half-hour will not be a terror to him under such circumstances. He will not be called upon to experience that sense of helplessness which attends the rush of a car down-hill. There should be few exciting moments. Progress will be swift if such a road be chosen; while, should it not be chosen, our neophyte's career as a motorist may be terminated upon the spot.

So we will go out to a broad, straight stretch, and here we will place our novice in the driver's seat and ascertain how far he understands the use and the meaning of the various levers he sees before him. Perhaps the very first thing to instil into his head is the way to stop the car. Impress this upon him again and again. Let him understand that he has but to press down both feet firmly upon the pedals to bring the car to a swift halt. There should be no accelerator pedal upon a beginner's car, and if there be, it should be temporarily disconnected. Ten to one he will use the accelerator instead of the foot-brake should an emergency arise. So—having nothing to do with accelerators—but concentrating upon the brakes, be sure that the facts of them are in his head, and then and then only go on to other matters.

The instructor, I am presuming, will have charge of the engine at this time. He will start her up and show the novice exactly how her speed may be increased by opening the manette upon the steering-wheel—so admitting more gas and obtaining more power. From this the transition to the change-speed lever is easy. Our young friend must be told fifty times at least that he must not try to move the change-

speed lever from one notch to the other until he has pressed down the clutch pedal. You cannot repeat the story too often; and when you have repeated it, it is fifty to one that your pupil will forget all about it in the first five minutes.

But we will suppose that he is an apt pupil, and that he learns quickly. Even so, it is well, before he begins to steer the car, to drive him four or five miles yourself, and show him exactly how the various changes are made and why they are made. You will also emphasise the fact that it is not necessary to turn the wheel over much to steer the car. Here is the secret of the novice's failure at his first attempts. He hoicks the wheel round as though he were steering a ship. A violent swerve to one side of the road is countered by as violent a lurch to the other. The Man who Knows holds on with both hands and prays to Heaven for his innocent children. But the novice is rarely perturbed. Death is the last thing he fears.

So we impress upon him at the outset the need for a light touch upon the steering-wheel. Indeed, this lightness of touch is the whole art of driving a motor-car, whether it be with the hands or the feet. Just watch the raging, ramping chauffeur as we know the specimen and dread him. Hear the crash of his gears—follow him as he pulls upon the steering-wheel and almost wrenches your tyres from your rims. This is smart driving as they speak of it in the kitchen. It is not the kind of driving you would teach your novice, and all your efforts must be concentrated in another direction. Gentleness, firmness, common-sense. These drive a motor-car as nothing else can do.

When our beginner is at length installed in his seat, when he understands the purpose of the various levers, then we may start the engine up and take our seat beside him. Some teachers' cars are fitted with a supplementary pedal upon the left-hand side of the dash—an excellent invention, and one that saves many accidents. If it be not present, the beginner should not be allowed to start until the road is quite clear, and when he starts his instructor should repeat the cycle of operations aloud.



*Depress the clutch.*

*Put on the foot-brake.*

*Take off the side brake.*

*Move the change-speed lever forward until the first speed is engaged.*

*Open the throttle moderately.*

*Raise the right foot gently and let the left be raised after it.*

These operations release the foot-brake and cause the clutch to engage. The car will now start smoothly, if the left foot be raised smoothly ; with a jerk, or not at all, if the left foot be raised quickly.

These movements must be practised over and over again until the beginner is thoroughly familiar with them. At the first attempt the car must not be run more than fifty yards before he is told to stop. A frequent use of the brake engenders confidence. And remember that we have to train an instinct for the right thing, to cultivate that instantaneous response to emergency in which the foot goes down as surely upon the brake as a man's hand goes to his hat when the wind is high. We can only do this by practice. So let the beginner practise putting on the brake—and make him repeat the operation fifty times. When he is sure of it, then he may be taught to change from the first speed to the second.

*Close the throttle.*

*Depress the clutch pedal.*

*Move the lever firmly forward.*

*Count three and then push the lever until the catch engages with the second-speed notch.*

*Open the throttle and let in the clutch as gently as you can.*

*But do everything slowly—there is no need to hurry.*

It is simple enough to write, but oftentimes how difficult for the beginner to follow ! If he knows what is happening he will learn more readily. For now he recalls the A B C of it, and recollects that he is putting a different pair of wheels into mesh, and that one shaft is revolving quickly

while the other is turning very slowly. He must get them revolving at the same speed before he tries to engage the cogs, and the engine must not be forcing them. For this reason, he cuts the engine off by depressing the clutch pedal and waits an instant until the shaft has done spinning. It will be the reverse when he is coming down from the second gear to the first, but of that more anon.

When he has learned to put the car upon the second speed, our interesting pupil may now be left to learn to master the steering, and to obtain that sense of command which is indispensable. He will soon get over his first wild pirouetting—for there is nothing so easy as to steer a modern car; and when he has done so, we may exercise him in nicer movements—such as steering over a particular rut or hollow in the road: a quick stop for an imaginary dog; the application of the side breaks; the gentle manipulation of the clutch that everything may be done smoothly and with no conscious effort. Should he miss gears when changing, impress upon him the necessity of instantly returning to the original speed and of closing his throttle. He must be taught that violence under such circumstances will achieve nothing at all but the probable stripping of the gear wheels. In all such cases I have found it better to compel him to bring the car almost to a stand and then to start again with due deliberation.

Men find changing down much harder, as a rule, than changing up. This is especially noticeable upon cars which have only three speeds. For my part, I think that no car is a perfect car which has not four speeds, and I would strongly advise the beginner to learn upon such a car if he can. In any case, he must be taught the secrets of “coming down,” and taught them carefully. Let him remember now that it is the speed of the primary or engine shaft which has to be increased. Ergo, he need not throttle down his engine before making a change, and he should just slip his clutch—not depress it or hold it out. Here again some quickness of movement is necessary—not a frantic quickness, but one quick, steady movement which will instantly engage the

lower gear. Put in brief, the cycle of operations is as follows :

*Put the hand upon the change-speed lever.*

*Press the catch if there be one.*

*Slip the clutch quickly with the foot, and as you do so draw the lever smartly back.*

This is a simple statement of the process, but both in changing up and in changing down much more is necessary. One of the most difficult things is to time the change properly—that is to say, to know when to change to the engine's advantage. This can only be learned by many months of practice. Some men never learn it, and for that reason remain poor drivers to the end of their days. But the beginner will quickly perceive certain broad facts, the first of which is that a change up must be made directly the car is running so fast that the engine races upon a particular speed—and that a change down must be made directly there is the least flagging.

Nowadays a silly doctrine of "everywhere upon top speed" is preached by manufacturers and mad chauffeurs, and is doing infinite mischief to many cars. There are few engines made, unless they be of large horse-power, which will drive a reasonably geared car upon the top speed over all sorts and conditions of country ; and although modern practice is doing much to make the feat possible, it is still performed to the great detriment of our shafts and bearings, and often to their positive injury. The beginner, at any rate, will do well to steel himself against the heresy. Desire of advertisement has largely provoked it—a habit of pleasant lying in prospectuses has fostered its growth and helped the mischief. After all, the chief end is to keep our engine running at the point of its greatest efficiency, and this we shall rarely do if we attempt to run everywhere upon top speed.

Another practice against which a protest cannot be too soon recorded is that of clutch slipping. If a car will not mount a hill upon a certain speed without slipping the clutch, that speed should instantly be changed. With the latest



metal-to-metal clutches it is true that advocates of slipping have a better cause ; but my own experience goes to show that clutch slipping is a mistake at any time and under any circumstances ; and that the man who indulges overmuch in it is not and never will be a great driver.

We shall be putting our novice upon his top speed by this time, and he will be gaining confidence very rapidly. At such a stage we should teach him as far as possible to drive at all slow speeds with one hand. In France they insist upon the beginner being thus schooled—teaching him to drive with either hand in turn, and so making him master of the wheel under any circumstances. It is obvious that wisdom lies herein, and that no driver is worthy of any consideration at all unless he be ambidextrous. I grant that at really high speeds a very firm grip upon the wheel is necessary, but for all manœuvring one-hand control is necessary, and should be insisted upon at an early stage.

It remains to speak of stopping the car. Here I think we have another maxim to be repeated as often as the instructor has patience to utter the words. I have seen even old drivers bring a car into a garage and stop the engine before putting the lever into the neutral. Let the beginner, then, be made to understand that if he does not put his lever into the neutral he may kill himself or take a life more valuable. Should he be obstinate, there are horrible tales to be related. Not six months ago, from the stable next door to my own, horrid cries were heard to proceed, and the sound of the splintering of wood. Presently both doors flew open violently, a car carrying a man upon its bonnet dashed out, and would have achieved a tragedy but for the intervention of another driver who stood near by. The man had started up his engine with his change-speed lever in the first speed. And the car had responded with a savage vindictiveness horrible to see, driving the fellow headlong through the doors—which were burst open—and so into the yard beyond.

This story we tell our novice as we make him repeat the cycle of operations necessary to stop a car prettily.

*Bring your lever to the neutral position.*

*Put on the side brakes.*

*Close the throttle.*

*Switch off the ignition.*

Make him do this at least fifty times. If it does not become a habit from the start, disaster sooner or later is as certain as the evening of the day which first made of him a motorist.

## CHAPTER VII

### DRIVING AS A FINE ART

THERE is an historic chestnut telling of two anti-motoring justices in Ireland who were given a lift in a powerful car at the time of the Gordon-Bennett race. Fierce opponents of the new locomotion, they were, as Irishmen naturally would be, quickly conquered by it; and as the speed of the car increased, and the law began to be derided, their delight knew no bounds.

Presently, however, a prudent driver slowed up because he perceived a sluggish pedestrian upon the road before him.

"For what are you stopping?" asked one of the justices.

The driver replied that he was stopping because the man ahead did not hear them.

"Don't you see Pat yonder?" he said.

To whom the two justices replied as with one voice—"To hell with Pat."

Here you have the spirit which dictates many a rash and foolish performance upon the high-road. I was talking to the managing director of a famous company the other day, and he offered me a lift in his car.

"My driver," said he, "is one of the cleverest in traffic I have ever come across."

This was good news, and I entered the car with confidence. But lo and behold, we had not gone a mile before the driver in question had shaved a motor-bus by an inch, cut in between a big car and a van, and generally convinced me that he was destined for an early if honourable grave. Such men I have met before, and have also heard them praised; but that eulogy should come from the manager of a great business, one with long experience, astonished me not a little.



Now, this sort of thing is a thousand miles removed from the fine art of driving. The really great driver never causes his passengers to clutch the cushions with frenzied fingers, never makes their hearts beat faster, and never permits them to remember the dangers of the pursuit. Nothing has impressed me so much in a long experience of motoring as this very fact that the really great driver is the most prudent person you will find upon the road. Men such as Henri Fournier, Lancia, Jenatzy, and, above all, Charles Jarrott, take no risks whatever unless they be racing. I have had the privilege of sitting by Mr. Jarrott's side, and I can bear emphatic witness to the really amazing caution he displays at all times. The wild chauffeur both astonishes and dismays him. "I don't know how the fellows do it," he once said to me; "I tell them that they must be cleverer drivers than I am." The real truth is, of course, that such dare-devils have not a hundredth part of Mr. Jarrott's skill. They are mere road hogs, doing "stunts" for the benefit of admiring housemaids.

There are two phases of driving to be considered, and the same man is not always successful at both. I have known men, who are all nerve and skill in traffic, absolutely hopeless when out in the open country. It is not that they do not possess the necessary nerve. For some inexplicable reason, they never acquire the habit of fine driving in the country; are inept in coaxing their engine to do its best, unskilful upon hills, and clumsy when negotiating other vehicles. On the other hand, many a fine driver, who has learned all his skill in the country, is never at home in London—the traffic appals him; he is afraid even of safe openings; he allows his engine to race and boil. These men will remain, it may be, incurable. But the beginner must strive to acquit himself well under all circumstances, and he must make the fine art of driving a study from the beginning.

Let us consider town driving first. And here a word of protest. It is simply a mechanical outrage to drive high-powered cars constantly in London, or any big city. You cannot keep this great power under control and escape



*Photo by Charles Schall.*

Mr. S. F. Edge starts his Career as a Racing Motorist on 'a Motor-tricycle





certain consequences. Many of these engines overheat upon the smallest provocation. Other drivers tell you of red-hot clutches, and water boiling, and countless troubles attending a shopping excursion. If a man must have a big car for town use, then, opponent of the six-cylinder car that I am, I would advise him to buy a six-cylinder, and to go to S. F. Edge or to Rolls-Royce for it. These are possible and delightful vehicles in town, but big four-cylindere engines are simply a nuisance under such circumstances, and to be tabooed.

Assuming, then, that our car is a limousine, say, of twenty horse-power, or an open phaeton of fifteen horse-power, we shall be careful (if it is to be used largely in London) to have it geared low, and to be able to drive it for the most part upon top speed. The smooth pavements of our great cities make this possible without any undue strain upon the engine, and it certainly is a great comfort to be able to run a car at ten miles an hour and to keep it upon top speed. But it must also accelerate quickly, and I would name this a quality that every purchaser should insist upon when buying a car for town use. If the driver is to take openings with confidence, if he is always to remain master of the situation, then he must have an engine which gathers speed quickly. Otherwise he is always at a disadvantage—the best driver is lost under such circumstances.

But having such a machine at his command, what are the chief points about driving in town that permit us to speak of a fine art? They are in brief these :

1. So to drive his car as he would drive any fast carriage, taking proper but not undue advantages of its greater speed and controlability.

2. To use the horn as little as possible, and never in an irritating manner.

3. To drive as quietly as may be.

4. To take no risks whatever ; never to force an opening or to deal with other traffic aggressively.

5. To cultivate that power of quick observation which has eyes for what is going on upon the pavement as well as upon the high road.

6. To keep at a sufficient distance from other traffic, and never to find himself impounded.

7. To nurse his engine and not permit it to race.

8. To drive with the rarest application of the brakes.

Let us deal with these points one by one.

And first, the fact that a motor-car is a carriage possessing advantages over any carriage drawn by horses, but not such advantages as may be abused.

This, I fear, is a truth but ill appreciated. Men who own cars are disappointed when these cars do not perform miracles in London. I know some drivers who appear to think that all horse-drawn traffic should fly up in the air at their approach, that pedestrians should run races to oblige them, and that the high road generally should be cleared upon their advent.

Here is a foolish and ungentlemanly heresy. We have no rights at all which are not shared by other road users. At present we are but tolerated, and our very future depends upon our well-doing. Let a driver in London remember that he must do as the other traffic does until that traffic permits him to do otherwise. Possessing superior speed, he may pass cabs and carriages when it is safe to pass them, and not otherwise. The habit of rushing in at a block, of causing horses to throw up their heads, pedestrians to reel back upon the pavements, and cabmen "to tell Heaven about it" is a detestable habit, and one responsible for half the abuse showered upon the motor-car. At the end of the day ten minutes may be gained by such conduct; but years of prejudice are left behind.

And this leads me to my second point. The horn should never be used except to warn a pedestrian who is obviously unaware of the car's approach, or the driver of another vehicle who may be in the same position. If you see a man about to cross the road and he does not see you, then you must blow your horn. The same thing holds good when you are passing an omnibus which may draw out or a cab which may turn round. But it is astonishing how rarely a good traffic driver has need to blow his horn, and what gentle use he makes of it.

On the other side, you have the persistent horn-blower, who, being held up at a traffic block, will toot persistently as though drivers of vans and omnibuses would lift those vehicles on to the neighbouring roofs to oblige him. This man is another who does us much mischief. May time and common sense ultimately deliver us from him!

Our third point speaks of driving as quietly as may be. It is astonishing how much noise some wild chauffeurs can make. Every movement of the car is attended by a fierce clash of gears, a racing of the engine, a wild pirouetting which is altogether unnecessary. A good town driver learns to do all things in comparative silence. If he blows his horn, it is one sharp blast; you cannot hear him change his gears; his engine never races. But these men are very rare, and are chiefly found in the ranks of the amateurs.

Our fourth point is perhaps the most important of all. Nothing is more appalling than to drive with a man who delights in showing you how clever he is. In reality he is not clever at all, but merely a fool. I have said that a great driver never risks anything. If he has the slightest doubt about an opening, he prefers to miss it. And mind you, he so handles a car that he can take his openings far more readily than the incompetent dasher. Watch how he approaches a vehicle ahead. He does not come up straight behind it, but wherever possible to the right, so that should an opening offer, he can come through slightly to the left and lose no time about the business. This is a maxim which applies as well to driving in the country as in London. It is quite obvious when pointed out—though it is astonishing how many drivers remain ignorant of it.

I say that we should never force an opening. Let us imagine ourselves driving a pair of horses, and a fellow with a huge car suddenly cutting in before us, causing our pair to shy and perhaps actually bruising one of them. We should say that the fellow who did this was a ruffian and the language would not be too strong. Sometimes, alas! the passengers in the car applaud this kind of thing and cannot have too much of it. I saw a leather-coated hooligan driving a couple of



women the other day, and he cut in before an omnibus just in the way I have mentioned. The women expressed their pleasure by broad grins which did not escape old Ike's observation; and when at a block some two hundred yards further on the omnibus overtook the car, then the moment of utterance came. "Where did you pick 'em up?" the omnibus man asked the leather-coated individual jovially, as he indicated the ladies with a jerk of his whip. Nor was any answer vouchsafed but a black and stony stare.

The man who learns to pass other vehicles properly, not forgetting the body of the car behind him and the objection a horse may be supposed to entertain to a Cape-cart hood thrust suddenly into his mouth, will also be the man to cultivate quick powers of observation where the pedestrian is concerned. I am sure that many accidents are caused by the driver of dull perception. This man does not think as he drives. He never pauses to ask himself what that old gentleman yonder is going to do—the patriarch upon the pavement, who is meditating crossing. He does not tell himself that this old man may be very deaf and quite unable to hear his horn. So, again, with children, he is never prepared for their swift dash across the streets, their sudden determinations, their entire preoccupations. A child playing a game has eyes for nothing else. You may hoot until the rafters ring, he will not hear you. And so it behoves the careful driver to protect such children from themselves; to anticipate their movements; to say that they are sure to do the wrong thing. When he approaches a group of children playing he will have the car under such control that he could stop it in a yard if need be. And the same rule must apply when passing traffic whose direction is doubtful. The world is not perpetually on the look-out for motor-cars to pass, and never will arrive at that blissful state. Let us remember the fact constantly wherever we are driving.

My sixth stipulation concerns the driver's own comfort rather than that of other people. How often do you see men driving in town and running right up to the back of another vehicle, so that if by any chance the horse of that vehicle

takes a step backwards, the car's lamps are smashed or the radiator cracked ! It is just as easy to stop a couple of yards from the back of a carriage as a couple of inches. Many a paid driver prefers the latter distance, leaving his master to pay for the unobservant partiality. And then, what a figure a man cuts who gets tied up in a line of vehicles, so close to the one in front that he cannot possibly get clear without reversing, while to reverse may be impossible by reason of the press behind ! It would all have been simple enough had the driver left himself a way of escape in front. He merely did not think of it, that is all ; and so we have the gesticulating and swearing and commotion, the wild shouts of perspiring policemen and the foolish grins of the people in the tonneau. Beware of this when driving in London—a moment's thought about it will save you many an unpleasant five minutes.

My seventh point concerns both town and country. A racing engine is a deplorable thing to hear. Some men seem to take a delight in racing their engines wherever possible. Directly they have started up, they advance the ignition to the full—and although they are about to start the car upon the first speed they are doing twelve hundred revolutions a minute where seven hundred would serve them perfectly. So, also, they must accelerate every time they declutch, even for an instant, regardless of the smooth pavement or the easy conditions under which the car may be running. The good driver, on the other hand, makes it his business to accelerate his engine in exact response to the needs of the car. He starts away without any whirr at all ; he knows exactly the speed which will take up the drive under any particular circumstances, and his whole handling of the machine is prudent and workmanlike. Let the beginner determine to imitate him. Practice will soon teach him, if his mind be set upon proficiency.

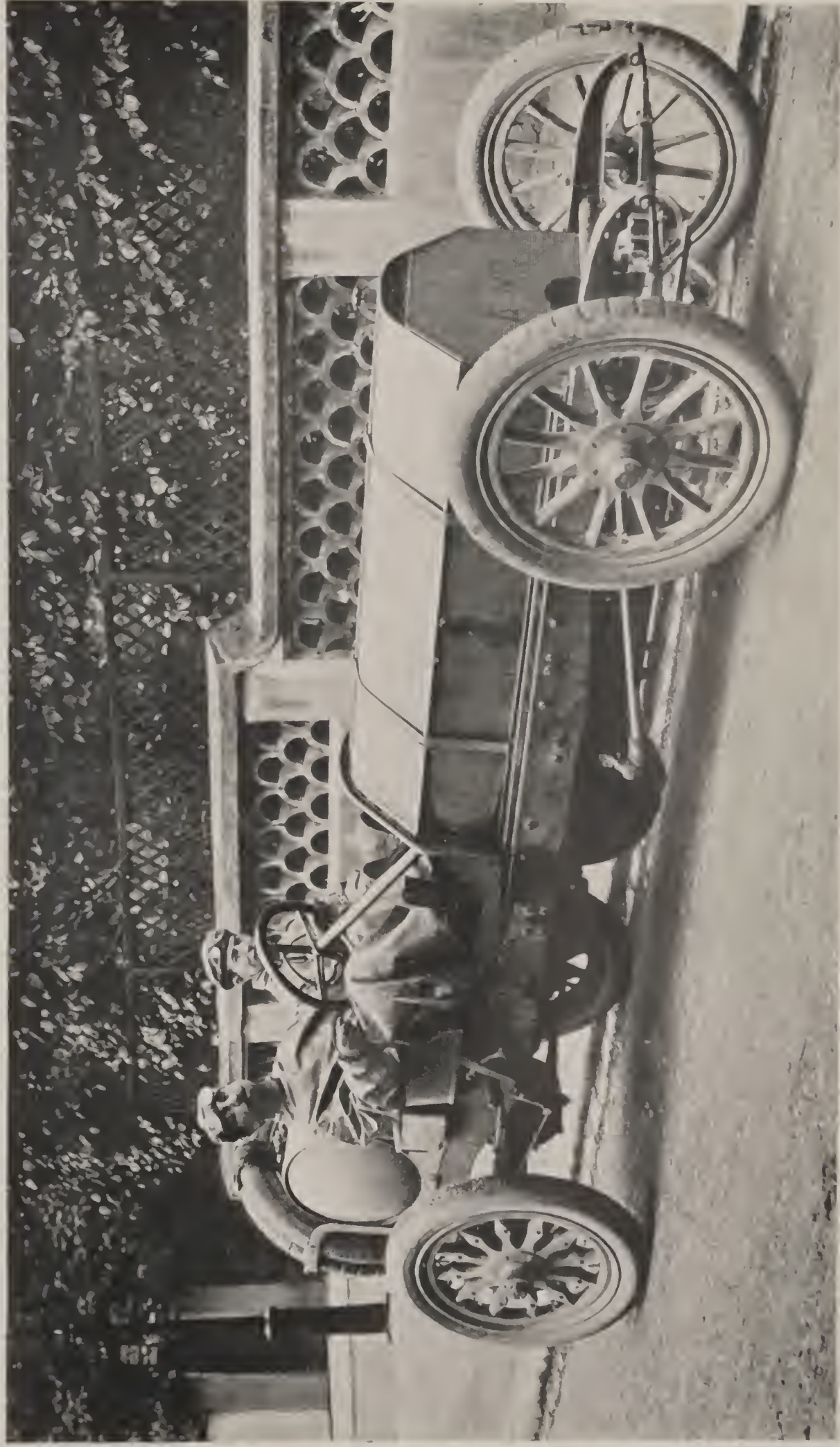
I will conclude these brief hints about town driving with a necessary word upon the use of the brakes. A first-rate driver uses his brakes very rarely. The slap-dash fellow employs them perpetually, and asks you to admire the

performance. At every corner there is a violent declutching and a foot-brake banged on. He races to the door of your house and slithers the last ten yards lest you should save any money on tyres this year. Of the side brakes he rarely thinks unless the car be at a standstill. This man does not even know that the correct way to slow a car down is to close the throttle and leave the clutch in. Should you tell him so, he would laugh at you ; for vanity is at the back of it, and upon vanity, ignorance. The good driver, however, will slow his car nine times out of ten simply by closing the throttle and letting her run. He does not wait until he comes to a corner to put the precept into practice, but has closed his throttle a hundred yards away. So at cross-roads he runs across them with throttle closed. Perhaps his finer instinct tells him more surely where he will have to stop. The ruffian of the garage seems to regard every check somewhat in the nature of a surprise. Not so the master of the car, who has an instinct for anticipation, who seems to take in everything at a glance, knows where the traffic will check him and what are the dangers of any particular crossing. This is the fellow for the novice to imitate. He will learn fine driving by such a man's side—and he should make it his ambition at the outset to obtain such advantages and to profit by them.

In one of Dan Leno's songs he used to tell us how, when hunting, his liberal spirit permitted the horse to take him through lonely gardens and the greenhouses thereof. So, there are men who do not drive motor-cars—they permit the car to take them, sometimes, as we know, through brick walls and at other times into harbouring ditches. These men owe their accidents to the fact that they never were drivers at all in the proper sense of the word. Our novice, preferring the high-road and a warm bed o' nights, will not cease to tell himself that "prudence" is the first and last word in the consideration of this great question.

For it is prudence that saves our necks, and a lack of prudence that gives so many welcome opportunities to the news-editors of the halfpenny papers.





*Photo by Campbell-Gray.*

Mr. D. M. Weigel in his Grand Prix\_Racer.



## CHAPTER VIII

### THE SUBJECT CONTINUED

**M**R. JARROTT has described racing upon the high-road as a sport for kings. If this be so—and few will contest the assertion—then assuredly is fine driving upon the high-road the king of sports for the ordinary mortal. I am not hereby claiming any kinship between the two diversions. There is all the difference in the world between driving a racing car upon a public road and driving a touring car. None the less it is in the country that our skilled driver will instantly assert his superiority ; in the country that we shall most justly appraise his virtues.

The Motorist of To-day rightly claims a greater freedom when he has left the towns behind him. Preaching the gospel of the public safety, he resents restrictions which do not concern the public safety ; and in the end the justice of his cause must prevail.

If anything will help it, the new favour in which moderate rates of speed are held should be named before other agencies. We are all tired of being hurled along at forty or fifty miles an hour—even if the place be a desolate moorland and the road be as solitary as the Great Sahara. We have named thirty miles an hour for the comfortable speed, and at thirty miles an hour the average man delights to travel. As the law stands this brings him frequently to the police-courts. But when the British public (which in the end is invariably a sane public) has learned a little more about the motor-car, then the country justice, the half-pay colonel, the hundred-years-ago parson, and the retired farmer who has hay to sell will be dethroned. We shall get something like justice, and Parliament will assist us.



Here is another story. My business at the moment concerns fine driving in the country, the laws of it, the secret of it, the beauty of it. Just as prudence was the last word of my previous exhortation, so would I make it the first of this. Your great driver in the country is also a prudent driver. But he is very much more than that; he is a man of nerve and judgment and of self-restraint. His powers of perception are trained above the ordinary—he is something of an engineer and something of a mechanic. Years of practice have made him what he is. He has the road habit to the point of instinct. There is hardly a situation upon the high road with which he is not familiar. Carriage or cart, waggon or van, traction engine or lorry—our great driver knows exactly what will be done with each and when it will be done. His long journeyings abroad have taught him this—the pilgrim's way has brought him at length to the shrine of knowledge.

I have always found that old cyclists make the best country drivers, and undoubtedly it is a great help to have done some cycling before one begins to motor. Old coachmen are not bad pupils, but apt to lack nerve at higher speeds—but I would always prefer a coachman to a man who has not been upon the road before, and where possible a married coachman of decent middle age. These will not be tempted to take your parlour-maid out upon saints' days and holidays. They will invite no risks. Some of them continue to treat a motor as a horse until the end of their days. When they pass a sheet of white paper in the road, they hold the steering wheel with a sure hand lest "the thing" should shy. I have often heard them cry "whoa" to a car that was running fast down-hill.

Let us, however, assume for the moment that we are addressing comparatively inexperienced men and trying to tell them what are the secrets of driving safely upon the high-road. For my part I should speak first of cross-roads, and should speak unhesitatingly. If you analyse motor accidents in the open country, you will find that thirty per cent. of them happen at cross-roads, another thirty, perhaps,

when passing other vehicles—while the remainder are at corners and upon hills. But of all dangers that of the cross-roads is the most vital and demands our closest attention.

Just consider the case of the wild chauffeur who disdains to blow his horn at a cross-road and would scorn to declutch. Well, that man is simply backing his luck. He is as much a gambler in human life as the gentlemen of Monte Carlo are gamblers in louis d'or or five-franc pieces. Should another vehicle emerge when he is ten or twenty yards from the crossing, he will most certainly crash into it, his car possibly will be overturned and its occupants killed. But with these chances he refuses to reckon. There will be neither cart nor waggon emerging, says he. He has passed that road a hundred times in safety—why not this time? And so he may go on, perhaps for years, perhaps to the end of his career if luck be with him. Should, however, he be an unlucky man, he may meet the cart at the second attempt and kill his owner before that worthy fellow has even paid for the car which carries him.

This is something for every driver and every owner to keep constantly in his mind. Those who dash by cross-roads are deliberately risking their necks every time they do so. They may cross a thousand times safely; they may not cross three times. And when such accidents happen, they are nearly always serious. A famous one upon the Coventry road in the spring of this year, when a small car emerging from a lane was charged by a larger car upon the main road, caused the larger vehicle to turn three complete somersaults before it came to rest. It went over and over like an acrobat, dashed its occupants violently to the ground, maiming and disfiguring them. This does not seem to have been a case of rashness, but of a hidden cross-road—a peril we have all to face. But the moral of it is none the less useful.

Let us never forget that when a heavy-motor car is travelling at a speed of thirty miles an hour, it cannot conveniently be stopped under fifty yards. I know that

gentlemen doing "stunts" have stopped show-cars in ridiculous distances; but reflect upon the swiftness of the danger, the instantaneous response the driver has to make—the seconds that must intervene before his hand or foot goes to the brakes at all. Here you find the secret of many catastrophes otherwise inexplicable. The driver's nerve did not respond to the emergency. He simply sat spell-bound—and, as it was proved in one considerable accident, he made no attempt to apply his brakes at all.

My own rule at cross-roads is to close the throttle at least a hundred yards from them—that is, if I am travelling at any considerable speed. I do not declutch, but just permit the car to roll up to the crossing, passing it, perhaps, at a speed of twenty miles an hour or less. If you are prepared for emergency, you can stop a car running at twenty miles an hour in its own length. This means to say that a vehicle must emerge when you are some three or four lengths from the crossing; otherwise the driver will hear you and check sufficiently for you to slip past. Should he not do so, you can stop absolutely dead—or at the very worst you can so check your speed that a trifling bump will be the only result of indiscretion. In this respect I have found high-powered cars to be much safer than those of a lower power. They enable you to accelerate and run out of danger; and a sixty-horse car will often escape an accident which would have been unavoidable in a "twenty."

Some drivers deceive themselves by a pretence of checking at cross-roads. They declutch momentarily, and so swiftly that only a trained ear can detect the act. This takes place, perhaps, twenty yards from the crossing; but they let the clutch in again instantly, and the speed of their car is not diminished two miles an hour. This is a habit to which wild chauffeurs are partial. They would have you think that they are driving carefully, while, in truth, their indiscretions are blazing. These men know very well that they are backing their luck. They prefer to back it and to risk their employer's neck rather than be ten minutes longer upon the journey.



A driver cursed by this habit should be instantly dismissed. But the amateur himself must take care that he does not drop into it. I have known men, who began prudently enough, develop into perfect dare-devils when a few years had passed. This means to say that careless habits had crept upon them and that luck encouraged them. They were men who had no narrow shaves ; they had never taken a risky opening and discovered a tram-car at the other end of it ; no waggon had ever rolled down a hill and appeared suddenly on the high-road before them ; they have not met the driver who pulled the wrong rein, or the waggoner asleep. And so their misplaced confidence becomes greater every day. In the end their rashness astounds you—you can but pray for them.

The same maxims, which permit us to take the cross-roads safely, apply, almost without qualification, to the taking of corners. Some years ago, when the first considerable book upon the motor-car appeared, the authors perpetrated an astounding heresy, the mischief of which has been beyond all imagination irreparable. They persuaded a clever artist to draw a picture in which a motorist in a big car was shown to be taking a sharp corner on the wrong side of the road. How many thousand ignorant people have learnt to take corners on the wrong side of the road since that day, and through the agency of that drawing, I should be sorry to say.

It is all very well for the authors to tell us, in a later edition, that a corner should only be taken on the wrong side when a clear view of the road is to be had. This comes too late, and cannot minimise that deplorable habit into which so many of our drivers have fallen. Almost every week I drive with some man or other who edges to the wrong side of the road every time he approaches a corner. Should he meet another vehicle, a violent swerve to his own side is the result. Good luck alone saves the neck of such a man. One day he will meet a car driven as fast as his own, and also upon the wrong side of the road—and the result will be a flaring headline in the evening papers and the

shrieking of old washerwomen in the correspondence columns of the dailies.

We must remember that our motives in taking a corner steadily are not purely philanthropic. The side strain upon the spokes of our wheel is considerable; the wear upon our tyres disastrous. Caution not only is an act of charity toward insurance companies, but toward ourselves. If we would save our tyre bills, let us boycott high speeds upon corners, and we have already done much to arrive at a wise economy. But more than this, we are, as it were, prudently insuring against other accidents than those of collision. How many a car has been wrecked because a cover burst upon a corner! It would never have burst had the driver been travelling at a reasonable speed; but the side strain upon it was too great, and the result has been told in the coroner's court.

This is a debatable point, I know. Experts prate loudly of the trifling swerve which will attend a burst cover even at high speed. But get these men into a corner and they will admit that their logic is better for the smoking-room than the high-road, and that, after all, other stories may have been told. For my part, I do not believe that even the cleverest driver, rounding a curve at high speed, could always save his car under a given set of circumstances. The swerve which is trifling upon the high-road becomes considerable upon the corner; it may be sufficient, even with a master at the wheel, to throw the car against the bank or to leave it in the ditch. No motorist of real experience will pretend that this is not so. The oldest of us understands the penalties of rashness only too well.

It behoves us, then, to take corners as prudently as we take cross-roads. If we cannot see round the corner the car should always be well in hand; and that it may be well in hand we must close the throttle some fifty yards at least before we run up to it. A rigid adherence to our own side of the road is the first guarantee of safety. A blast upon the horn has saved many a smash. And to these rules there are few exceptions. Granted that over a mainland

or the roads of France a fine driver will take even considerable bends with scarcely any slacking of speed at all, his skill must not excite the novice to emulation. It is never an easy thing to steer a big car round a corner at anything approaching a high rate of speed. Let the neophyte, who would sleep without plaster upon his nose, remember this when temptation comes to him.

All the world understands, I suppose, that in descending hills the dangers of corners are magnified twenty-fold. It was the corner upon Sun Rising Hill which brought about that deplorable disaster to a party of Americans in the summer of 1907. The wheel of the car would not stand the twofold strain of the application of the brake and the swing of the road. The spokes were shattered; the carriage overturned.

Up-hill, on the other hand, a car may often be kept going at a corner when it would be rash to the point of madness to maintain the same pace upon the level. You can stop a car up-hill so quickly. The control of it is always in your hands. And unless you be a Lancia upon a Fiat, you will have little to fear from corners when climbing.



## CHAPTER IX

### THE MAN AND THE ENGINE

TO become a really fine driver, a man must understand not only how to handle his car at all speeds, but also how to get the best out of his engine. This means to say that he must be something of an engineer and not above passing his "Little Go" as a mechanic.

There are many who pretend that a car can be driven with hardly any attention at all save that of oiling and cleaning it. I venture to describe the assertion as an absurdity of the grossest kind. None but an engineer can keep a motor constantly running at the point of its greatest efficiency; none but one with an engineer's instincts and a mechanic's practical knowledge can drive a car to the best advantage.

Let me say frankly that this need not frighten any would-be amateur. The amount of knowledge required is not considerable; a few months' experience upon the road will soon endow even the dullest with some glimmering of necessary truths. Should our amateur begin with a small car (and he would be foolish to begin with any other unless he intends to take a trained driver into his service), he may muddle along very well with such a reliable little machine, say, as the Swift or the De Dion, until proficiency be attained. There may be occasions when he will have to walk where others would have ridden. On the other hand, he may be as lucky as a young friend of mine who bought a Beaufort car, not knowing one end of the engine from the other, and drove it for ten months without a single involuntary stop.

I think it an over-rash proceeding for any man, however gifted, to dispense with some trained assistance until he has had his car for three or four months. He should certainly take an expert out with him regularly at the beginning, and

not dispense with skilled aid until he is really master of the machine. Let there be a man at his side who can tell him instantly what is the matter. He himself must learn to diagnose each trouble as it arises, to ascertain both the cause and the remedy, and to assure himself that he could deal with such a difficulty should it overtake him when alone on the car. Line by line will the book of his experience thus be written. But he will remember as he would never remember were he merely to read and upon reading to rely.

It is in the complete knowledge of the engine ; of its every phase ; of what it can do and what it is not doing, that we see the fine driver at his best. The car has not gone five miles before such a man will tell you whether things are well or ill with it. "The petrol is not feeding," he will say, or "I am getting too much petrol." He detects a want of synchronisation in the cylinders immediately, and seems to know by instinct which cylinder is missing or mistimed. He knows instantly if the machine be running hot, he detects a faulty clutch before the man at his side is aware that there is anything the matter at all. These defects he may cause his chauffeur to remedy. But that worthy can never fool him. He knows when all is not well with the car, and is quick to insist that it shall be well.

Let me endeavour to state some facts I have noticed when sitting by the driver's side and watching some of our greatest experts handle some of the most famous cars.

In the first place I have observed that they permit the engine to warm steadily to its work. They do not try to force the car immediately to its highest speed, but, quietly nursing it, they first ascertain that all is well, and then only do they "open her out." This restraint is emphasised when first starting off. A good driver listens for some minutes to the beat of his pistons before taking his seat. He does not race his engine when standing still ; but permitting it just to "purr," he opens the throttle notch by notch until there is speed enough to take up the drive, and not until then does he let in his clutch.

The second point I have noticed is that of the experi-

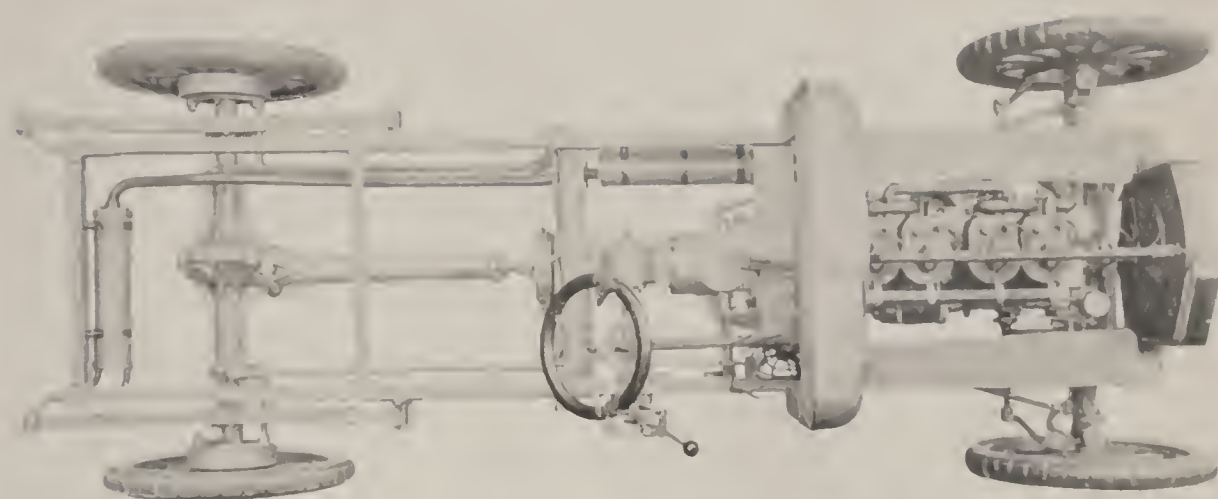
mental stage. There are no two days, perhaps not two hours together, when the engine does not require a changed position of the levers to give the best results. Here you will be wanting plenty of gas and a slightly retarded ignition ; there little gas and ignition greatly advanced. If there be an extra air inlet to your carburettor, it must be manipulated every morning until the explosions attain their maximum efficiency. This the trained ear can detect at once, but the training requisite will not come until our novice has been a thousand miles upon his car.

The second characteristic of the fine driver is his knowledge when to change speed. Disregarding all the advertising talk of cars which will go "everywhere upon top speed," our expert regards this as "trade rubbish," and will hear none of it. Let the engine flag but a suspicion and he is down a speed instantly. He knows the meaning of the words "stress and strain." Should he be checked considerably in traffic and be upon his top gear at the time, then, even though the road be level, he drops a speed without hesitation. Why ask the engine to wrestle unnecessarily with its burden ? The owner of a car does not care twopence for the maker's high falutin'. He wishes his engine to last, and treats it as it should be treated.

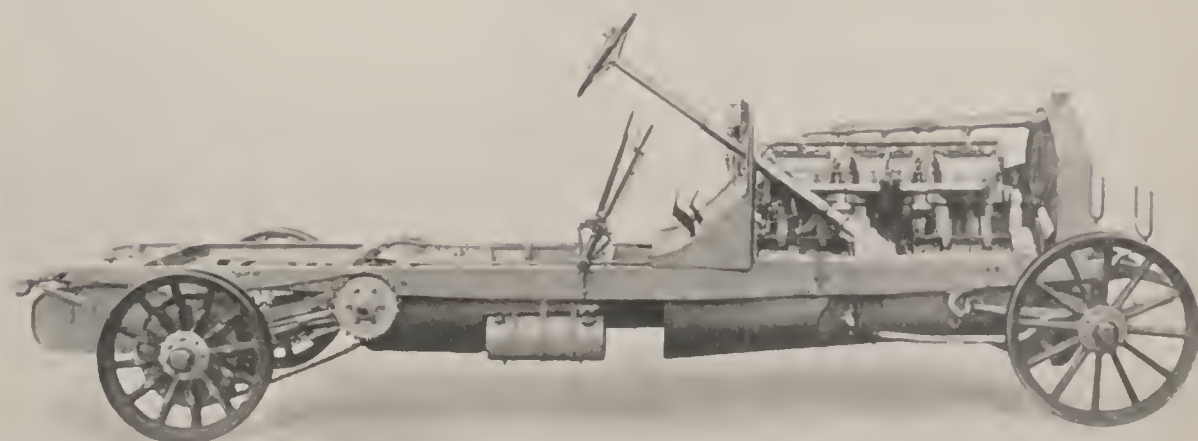
A good driver approaching a considerable hill will not keep upon a speed which he knows will carry him but a few yards up that hill. And yet how often do you see this kind of thing done ! Men driving upon the "fourth" know perfectly well that the "fourth" must be almost instantly changed to the "third." Is it not far better, then, to put the car upon the "third" at the bottom of the hill and thus to let the engine do its best from the beginning ?

So, also, in descending the hill. No man who is entitled to be called skilled would drive a powerful car down-hill with the throttle open. Far from it, the opportunities for cooling the engine are all too valuable—and so your master instantly switches off his ignition and lets the car roll down against compression. If he have one of the modern devices by which cold air can be sucked into the cylinders, so much





The 20-h.p. Rover Chassis.



*Photo by Campbell-Gray.*

The Six-cylinder Mercedes Chassis.



the better. His engine will be running sweetly enough when he "switches on" again, and the rewards of his prudence will be many.

A good driver uses his brakes alternately upon long hills. He knows that even the latest brakes which are not water-cooled may overheat. So, should the descent be vicious, he may even put the car upon its first speed and descend the hill with occasional touches, first of the side brakes, then of the foot-brake. Should it be necessary to come to a dead halt, he will have power enough in reserve.

This is to say that a good driver takes nothing for granted. Should he have any doubts about anything at all, an instant investigation is demanded. The chauffeur *thinks* the accumulators were charged. The wise master insists upon the production of a voltmeter there and then. The man is quite sure that the metal-to-metal clutch was washed out last week. The experienced driver, convinced that the clutch is slipping, will have it washed out again and take no chances. The man affects an injured air when it is hinted to him that there may be both grit and water in the carburettor. Off comes the lid in the old driver's presence, and keen is the eye which searches for the golden but unwelcome grain.

It is amazing how these paid drivers will face a lie out if to admit it brings work upon them. I remember once being assured by a driver of my own, upon his solemn word of honour as a man and a father of a family, that the new shoes fitted to my pedal brake were not touching the drum when the pedal was up. I took this solemn word thus solemnly delivered, and before we made Barnet the brake had fired. An older hand would have been down under the car ascertaining the truth for himself; I preferred a touching confidence and a railway train.

It is vigilance indeed that saves the successful motorist, and with vigilance, knowledge. I can but repeat that shrewd observation is the best master, and that every novice should submit to all the coaching he can get from those who have learned these things by experience, sometimes bitter, but always valuable.



## CHAPTER X

### CHAUFFEURS

WE have lived down a great deal of humbug in the matter of motor-drivers, and are beginning to know where we are. I can perfectly well remember a day when it was thought necessary to pay a good chauffeur £5 a week ; and men considered themselves lucky to get servants at that. The truth was that the demand exceeded the supply in a perfectly preposterous manner. Chauffeurs of that time were mechanics taken straight from the shops ; and when there were not mechanics enough to go round, then we engaged small boys who wished to be mechanics. Any youngster who hung about a motor factory and picked up a little driving knowledge was sure, sooner or later, of a "job" upon a car. But, in the main, the earliest drivers were skilful men and, taken altogether, possibly the best motor servants we have ever had.

Remember the enthusiasm which this sport inspired among its early votaries. Our drivers were hardly less keen. I could name one of them who crossed France with me in an old Panhard, and was rarely in bed during the journey. There never was a happier fellow. Long after I had retired would I hear the clang of his tools in the yard of the hotel. The imprint of his fine figure was left in the dust on many a high-road. Rarely did the car come to a halt but that his boots were presently displayed from the front or the aft end of it. He was as keen a motorist as I, and had fifty times my knowledge. To-day he is the managing director of a great English company. I will not say that he goes to the works in a horse brougham, but he may possibly emerge every morning from a costly motor-landaulette. And I believe

that the old days still dwell pleasantly in his recollection. In whose do they not ?

Men thought little upon the question of wages in those days. I have known a driver paid as much as £6 a week, and paid cheerfully. £200 a year was a common salary. Some years passed before we began to consider the question at all—for remember that to the rich it did not matter, while the poor man sold his very ancestors to possess a car. The commercial spirit had not then breathed upon the amateur to set him calculating. He did not keep natty notebooks wherein was recorded the momentous facts that yesterday he spent sixpence on swabs, and the day before had wasted a shilling that his brass might profit. The sport was all to him. Every day brought its revelations—and its bills. Perhaps he enjoyed the very penalty of paying. Was not the recompense beyond all belief sufficient ?

Now, this state of things obviously could not last. The time quickly arrived when the new toy had become a considerable financial proposition. We had settled down to the luxury of it by this time, and had learnt to complain about its cost. Surprising sums indeed were expended upon the car in those early days. I have known very rich men whose motoring cost them £2,000 for a single year. The expenditure of £1,000 was no uncommon outlay ; and, be sure, the cracked pots went to the wall. Many a poor man struggled hopelessly with a car for a few months, and then fled from the sheriff's officer. Makers themselves began to perceive that the thing must be cheaper. Where there had been one chauffeur among twenty owners, gradually there came to be twenty amongst one. A new class of motor servants was discovered. Youngsters began to throng the factories, and to cry for a share of this unheard-of plunder. The expected slump in wages came quickly enough. We heard no more of five pounds a week and rarely of four pounds. For my own part I am inclined to think that to-day we have even heard the last of three pounds.

Consider what your ordinary driver can do for you, and then ask why you should pay a heavy sum for such services,

The man, if he be a good servant, and has but one car to keep, will clean that car every day for you. He will drive you just as John, your coachman, drove you in the old time. He will be able to do such trivial adjustments as the modern car needs—keep your ignition in order, grind in the valves, adjust the brakes, attend to the lubrication. Should anything go wrong—even in the most trifling way—the average driver of our time will hasten to the shop. Of course he has a fine tale for you. There is something wrong with one of the cylinders, says he, or a gear wheel is stripped, or a star wheel broken in the differential. Some of the rascals can hardly solder a joint. Their great achievement is changing a tyre; and a pretty business many of them make even of this.

You, on your part, have hitherto been asked to reward such very primitive labour by unheard-of payments. But the motor world is beginning to get at the truth. It is beginning to understand that any youth can be trained in three months to do for us at thirty shillings a week precisely what the so-called skilled mechanic does for fifty. And presently it will not pay more than thirty. Of this I am convinced.

Of course there are some exceptions to a general statement of this kind. When a man owns a big and expensive car he certainly does want a skilled mechanic in his service. It would be silly to expect a converted groom to take charge, say, of a 6-cylinder Napier or a 45-h.p. Mercédès. These big cars need a trained hand if they are to give satisfaction. This is not to say that they break down more frequently than the small car, for certainly they do not. But the general handling of the machine, the promotion of its greatest efficiency, and the safe driving of it are not to be undertaken by any but the motorist of experience. Indeed, from the point of view of personal safety alone I myself would not permit any man who has not passed his twenty-fifth year to drive such a car; nor would I entrust one to his keeping.

In this case an owner may pay fifty shillings a week, and pay them with pleasure. What he has to guard himself against is imposition upon the part of the candidate and fraudulent statements of character. I have known drivers



come over from France with a bundle of certificates forged to the last line. There are others who secure general statements from easy-going masters, and foist them with additions upon unsuspecting applicants for their services. Against all this we must guard. A rigid investigation of a chauffeur's claims may save our very necks.

I could tell some fine stories of these men. Well do I remember a huge Dane who drove me to the station in the North of England, and having charged a bank, said by way of explanation : " You haf never been so near to be dead as you was this night." When his master asked me what I thought of the fellow's driving, I retorted by asking him for how much he was insured. He knew little about motoring, and considered it rather clever to round corners upon two wheels or to cut Q's upon tramlines. A fortnight after my visit he returned to London, and permitted his Dane to drive him into the City. They cannoned a tramway standard in the first half-mile, and my friend found himself among the lobsters upon a fish-stall. And so they came to the parting of the ways. But the Dane, I believe, is still driving in Paris, though heaven knows how many scalps are at his girdle.

And then the humorist ! One fellow, who came to me for a berth, upon hearing that I drove my own car remarked, truculently, that he was glad to hear it, but that he permitted no one else to drive when he was up. After him came a driver from the East, who had a habit of waving the populace aside by threatening flourishes of a great brown hand. In Egypt, perhaps, the Arabs had skipped before him ; but here in England people took it amiss, while the police at Shoreham had him in the dock in a jiffy. Well do I remember his historic defence. " Gentlemen," he said to the Bench, " the policeman he come here, he kiss the book, he tell you lies ; I come here, I kiss the book, I tell you the truth—how much to pay ? " And the answer was prompt—" Four pounds and costs."

Upon another occasion, when driving down Baker Street my Egyptian espied a lady in the road, dragging a pug-dog upon a lead. Alarmed at the sudden appearance of the car, this

good woman did not attempt to step aside, but merely lifted the squirming animal in the air. Happily the Egyptian stopped the car in a twinkling; but he also made a sage remark: "That she shall not make her dog dead she would kill her own life," said he.

And then the absolute frauds! A friend of mine in Hampstead, the owner of a 40-h.p. Mercédès, recently engaged a driver from a London school, and ordered him to bring the car round at nine o'clock upon the following morning. This the fellow did, and stopped the engine as he drove up to the door. Despite heroic exertions the poor wretch could not start up again, and when a passing chauffeur was kind enough to help him he promptly put in the reverse and drove the car violently into the iron gates before the house. His rewards were swift, for he was given a week's money and discharged upon the spot. It turned out that he had been taught to drive upon a 8-h.p. car, that he had had some half a dozen lessons perhaps, had never seen a gate change, and knew nothing of a magneto. Had he worried through, he would probably have ruined the Mercédès in a month. This I pointed out to the owner, who has now got a competent man at fifty shillings a week, and is not paying a penny too much.

It is, then, for the small car that the trained coachman or young chauffeur will do. Let the owner make it his business to understand what should be done, and the rest is easy. I myself am greatly in favour of young coachmen, simply because they already have a knowledge of the road, and this knowledge is invaluable to the motorist. Half the inconsiderate driving we see is simply the result of lack of this road habit. Why, some of the young chauffeurs driving about nowadays have never been upon anything but an omnibus since they were born. They know nothing of the rules of the road, of its courtesies or its penalties. Had they been in charge of horses, the transmission would have meant little to them. An old coachman knows what another coachman is going to do; he knows how to treat traffic; he is proud of the appearance of his car; and, above all, he is civil. That

insolence, not to be tolerated for an instant, which we encounter in the mechanical imposter is rarely associated with the coach-house. These men know their place and keep it. They are agreeable companions upon a journey, not merely insolent louts anxious to rob you when they can.

Let us suppose that you know of some such young servant in question and would have him trained to be your chauffeur. What should be your course? I am inclined to think that you should get him trained by the Royal Automobile Club if you are a member ; or, if not there, then at one of the better-known London schools whose thoroughness is not to be questioned. Of such schools that of the Argyll Company in Newman Street is certainly as excellent as any. There is, I am told, a very successful school at Notting Hill ; and there are many private teachers who will do this work to your satisfaction. The mistake that is often made by the pupil is that of taking a driving course only. No man, as I have said, can drive a car to the best advantage unless he knows something of first principles. And certainly no man can take charge of a car who is not acquainted with every bolt in it.

Thus, your would-be chauffeur should spend at least three months in a motor-works if he can. He should see every operation of the common day conducted again and again ; he should be taught, as he will be taught by the Argyll people, that honesty is the best policy, and that by honesty alone are good places kept. The old devices by which our chauffeurs robbed us are becoming too well known to be henceforth a source of any considerable profit. A simpleton indeed is he who permits his man to sell old tyres or to buy new ones, to choose a repairer, to run unchecked bills, or to take the car out just to try her whenever he may please. We have learnt the truths of these things for ourselves ; or if we have not learnt them, then we deserve to be robbed.

Writing upon this subject in *The Sphere* some time last year I made the following notes upon drivers and do not think that I can do better than reprint them here. Then, as now, I endeavoured to explode the theory of the skilled mechanic,



and to show how very few are the serious repairs that he can undertake for us.

“Let us readily admit,” I said, “that so far as repairs go the majority of chauffeurs are impotent. A friend of mine had a great idea that he would hire a renowned mechanic and henceforth dispense with repair bills. The fellow came to him backed by florid recommendations from foreign firms. He was installed ; he began. In a week he had spent about £60 in tools. In a fortnight the car was back at the manufacturer’s with a bent crank-shaft and a broken differential. This renowned mechanic celebrated his third week of residence under my friend’s roof by stealing the £60 worth of tools and emigrating to America. From that time his late master has employed trained grooms as chauffeurs ; he pays them 25s. a week, and on the whole is no worse off. He has learnt, as many have learnt, that the greatest fraud in motoring is often the professional mechanic. So that after all there is a sense of balance about the matter.

“The truth is, that cars are often very badly treated because the owner will not take the trouble to master elementals. It is all nonsense to protest that there is no mechanical aptitude. The veriest tyro can learn in a week enough about the care of a motor-car to prevent his driver playing fast and loose with him. I know many owners who never open the bonnets of their cars. They are quite unaware whether the man cleans the engine or not. They cannot tell you in what condition the clutch, gear-box, and differential are. As long as the superior person who patronises them cleans the paint (he is sure to do it with petrol) and polishes the external brass, they do not care for anything else. Sometimes you could grow mushrooms in the interiors of these cars.

“I looked into the undertray of a Spyker the other day, and found it full of grease and mud almost up to the clutch-shaft. I had never seen such a spectacle, but the owner did not even know that the floor boards took up. Now, a man can learn these things, and it is his duty to learn them. It is quite easy to see that the work is done if you know how it should be done. Any novice may understand that a car

should never be left overnight with the mud upon it, that it should be hosed down directly it comes in, that mud must never be rubbed or brushed off, that a spoke brush should never be used, that a sponge is the safest implement when a hose has been used, and after that a selvyt or a chamois leather. He should rigorously forbid his chauffeur to use petrol for paint-work. The commonest excuse of the motor-house is, 'We cannot get the motor-car clean this muddy weather unless we use petrol or paraffin.' This is mere laziness—it means to say that the men will not be at the pains to do the work properly. I repeat that a novice can see that it is so done just as well as any expert.

"The engine of a car should be cleaned every morning. French drivers have a much greater care for their engines than English. When I was touring in the south of France last year this fact was brought home to me somewhat ironically. The English drivers would be smoking their morning cigarettes while the Frenchmen were, to a man, cleaning their engines. At Toulouse I saw an English car reeking with oil and filth. Very proudly the driver told us that he had never cleaned his engine since he had it; needless to say he was an Englishman.

"See that your driver cleans his engine every day, and pay, as it were, surprise visits to the gear-box; take the footboards up when he is least expecting you to do so, and see how much of this world's goods you have gathered together in your undertray. A liberal allowance of filthy oil mixed with road mud and small stones does not bear witness to that zeal which even a moderate enthusiasm may demand. Discharge the man on the spot who keeps his car in a filthy condition, and you have done much to lessen the expense of keeping a motor-car.

"In the same mood, have nothing to do with the showy driver, so prevalent amongst the hired assassins of our own time. When you see a driver start the car with a jerk, ram in his second speed before he has gone five yards, and be on his top before he has gone fifty, consider yourself unworthy of him and make a change. He will do your

car considerable injury in a week, and will destroy it in six months. The plain truth is that we have been far too tolerant with these men, and too often allowed them to become our masters. Let us deal with them as we would deal with other servants, and then only shall we begin to get order in our motor-houses."

Let me add, in conclusion, that good drivers are often to be heard of at the Royal Automobile Club and at several London firms. The London Motor Garage Company in Wardour Street make it their business to supply men of assured character and ability.





Messrs. Botwood & Egerton's Garage at Newmarket.



Interior of Messrs. Mann, Egerton & Co.'s Garage, Norwich.



## BOOK II

### THE CAR

#### CHAPTER XI

##### THE MOTOR-HOUSE

WHEN we have ordered our car and engaged a trustworthy driver (if we can find such a treasure) our next consideration is the motor-house. Where shall we stable our car and under what conditions? This is an important question and not to be dismissed lightly. Much depends upon the way our car is housed. A cabined and confined stall may do considerable mischief. We must think of this almost before our order is signed. It will never do to be driven into any corner as some owners are.

Let us never forget that the common coach-house and the London mews are together responsible for not a little injury to our steering gears. I was discussing this question lately with an old driver, who told me that since he had come to London he used up quadrants as other people use leathers. His car is stabled in a narrow coach-house in a narrow mews. It is obviously absurd in such a case to dwell upon the fine precept that he should never turn the wheels of a car when it is standing. A certain amount of wheel manipulation is absolutely necessary to get our car out of such a trap as this. If a man must house his car in a London mews, let him choose a stable which is decently wide and to which access is direct—that is to say, not by a tortuous entry or a bottle-necked bay. In this case one reverse may get him home every time. I have known stables which even the cleverest driver could not make until he had twice reversed his car,



and upon that worked his wheel energetically when the car was at rest. This sort of thing would ruin the best steering that ever was built. We see it, however, in London almost every day.

Unfortunately both the situation and the management of the motor-house do not receive the consideration from owners which they deserve. I know many men who never visit their stables at all. They are both ignorant of, and indifferent to, the happenings therein. Putting a sublime faith in that very ordinary individual, the chauffeur, they entrust the whole keeping of their car to him, and are obedient to his requirements. If this fellow chooses to take "Mary Ann" out o' nights and show her what it means to do forty miles an hour on the King's high-road, he is perfectly at liberty to do so. Perhaps the owner would not recognise his own car if he met it in the street. I have known instances of the kind.

Now, all this leads to great extravagance. Chauffeurs are but human and will respond quickly enough if you invite them to take liberties. A man who is never looked after will quickly become clever at looking after himself. Let a driver discover that his master never checks his bills, has no interest in the car when not riding in it and generally is a lamb to be shorn, and the shearing process will begin soon enough. As a class, I fear, these men are not honest. There are many honourable exceptions—drivers who are a treasure in the house; men to be treated with the greatest respect, and to whom the management of the car can be safely left. But alas! they are few, and it would be foolish to pretend that they are not.

This being the case, any man who is contemplating motoring may well ask himself how much trouble he is likely to have in the matter. I will answer him that he need have very little. There is nothing simpler in the world than to arrive at a general idea of the cost of running a car; and when that sum is arrived at, the rest is easy. Inquire of a motoring friend what your yearly bills should be. If they exceed the sum, discharge your man. He may be unfortunate, merely unskilful, or dishonest. Do not trouble



*Photo by Campbell-Gray.*

*A Lanchester Brougham.*





your head about the particular deficiency, but discharge him. Money is being wasted somewhere ; and if you be as rich as Cræsus, you are foolish to waste money. I know owners of 20-h.p. cars who come to me and say that their cost of up-keep has been as much as £500. I tell them that it should have been no more than £350, depreciations apart, and that even this sum is a generous outlay. Possibly their car is a bad one, and in some part responsible for the charges. If that be so, it is the man's duty to tell his master frankly what is the matter. But in nine cases out of ten be sure that the car is all right and the driver all wrong.

I say that motor owners should visit their stables frequently. Some seem quite timid about the business. They tell you that their man would think he were suspected if they appeared upon the scenes, say, at ten o'clock at night. But their man's feelings are not under consideration ! and the owner who is afraid to assert himself in this way deserves all that he gets. After all, your motor-driver is but one of your servants. The stable is yours, and all that therein is. Visit it frequently ; drop in whenever you feel disposed, and you will learn more about your car in a month than twenty years of questioning would elicit. What is more, you will find yourself taking a new and pleasurable interest both in your car and its management. Motoring will become a real hobby to you—and there is none more engrossing.

Years ago it was necessary to tell an owner that he must have a pit in his stable. We lived largely under our cars in those days. Just as curates buy "litany boots," so did we feel it necessary to show sound "soles" to the populace. The heart of the machine was only to be observed by this abject grovelling, this personal abasement. How largely the construction of motor-cars has helped us to dispense with the pit, individual practice will bear willing testimony. Never in twenty-four months have I found it necessary to use a pit for my own Spyker. Modern cars, indeed, seem designed altogether to war upon the old abyss. The best of them are wonderfully accessible. You get at your clutch by lifting a foot-board ; you glance at your big-ends by opening an

inspection plate ; you release a spring clip, and the lid of the gear-box is to be lifted off ; boards raised from the floor of the tonneau permit you to get at the rear brake and the differential. The pit, indeed, is a thing of yesterday. You never hear of it in ninety per cent. of our motor stables.

This being the case, what are our general requirements when we come to house a car ? They are firstly a stable to which there is easy access. If we hire a coach-house in a narrow thoroughfare, where we must reverse frequently to get our car home, then, as I have said, our steering will be quick to chide us. Let the stable, if possible, be such that a car can make it with one reverse at the worst. We must have room for a bench in it ; and if our man be worth his salt, we should also be able to stable a lathe. This means to say that considerable space is desirable other than that for the car itself. A narrow, cramped coach-house means broken wings and dented body and other exasperating wounds which attend the return of a tired chauffeur and his desire to fly to the arms of " Mary Ann " aforesaid. And in justice let it be said that, however careful your man is, an oversmall stable will bring him to grief sometime. Even Homer may nod—and there is very little of the Homer to be had for thirty shillings a week.

Given a spacious stable, then, we must light it by electric light and see that it is dry. The former is almost indispensable. Gas must be always a danger where petrol is about—but more than that, gas is apt to rot our tyres and our spokes, to play the dickens with our brass work, and generally to depreciate our property. If we must have it, let it be used as rarely as possible, and let us see that the incandescent lamp is fitted everywhere.

The warming of the motor-house is the greater problem. Experts recommend hot-water pipes ; and undoubtedly much is to be said for them. But in London hot-water pipes are often out of the question, while a gas stove is highly dangerous and a coal fire impossible. I have found the charcoal stove as sold by Mr. Norton of Llandiwrod, Wales, to be the safest and most satisfactory thing under such circum-

stances. If you light this at night and throw the stable doors wide open next morning, you will suffer nothing by the fumes, while the house will be warm and dry enough for the next two days to come should there be no frost. In frosty weather, of course, the stove must be lighted every night ; but the expense of it is too trifling for words and its results undoubtedly satisfactory.

See that your driver always keeps the car covered with a waterproof cover. This is indispensable to the motor-house. I venture to say that a car will keep its good appearance for two or three years if it be properly covered directly it is cleaned. Have a sheet which will go right over it, keeping the tarnish from your lamps and the dust from your leather. In a similar manner you will have canvas covers for all your spare tyres and tubes, which will be hung upon nails about your walls. Damp is the enemy—and damp must be kept out at any cost. Compel your man to have leaking taps repaired at once ; see that the hose is in good order ; keep wet out of your stable.

As to the cleaning of the paint work itself, if you understand how a carriage should be cleaned, you understand also the cleaning of a car. Insist, whenever it is reasonable, that the mud shall be hosed off directly your car returns to the stable. Forbid the man to clean your paint with petrol ; but let him use a selvyt and plenty of "elbow grease." Some motor cars are shockingly treated in this respect. Lazy drivers will tell you, whenever they are away from home, that there is no accommodation for washing and that it really does not matter. Do not believe them—for if you do, your paint will soon have a tale to tell.

All this means that system is desirable, and upon system, oversight. A master who really means to have the thing well done will draw up a set of rules for his house and insist upon their observance. I have such a set in my mind and write them here for what they are worth. They are rules I insist upon in my own stable, and for the breaking of which I have discharged more than one otherwise useful man.



*Rules for the Management of the Motor-house*

1. All mud to be hosed from the car immediately upon its return to the stable ; but should the hour of that return be unreasonable, then the washing to be done before breakfast next morning.

2. The engine, all paint and brass work to be cleaned every morning without fail.

3. The whole car, including gear-box, differential, and undertray to be thoroughly inspected and cleaned once a month.

4. All steering-leathers to be removed once a week, the bolts thoroughly greased, the pins examined, and the wheels tested for alignment.

5. All tools, when not in use, to be kept either on the car or in their proper drawers, to which they must be returned immediately work is concluded for the day.

6. The car to be covered whenever it is not in use.

7. All spare covers to be kept in canvas cases and hung up against the walls.

8. No leakage of water to be permitted from hose or taps. No oil to be left on the concrete.

9. No sale to roving dealers under any circumstances whatever. Immediate discharge the penalty.

10. No unnecessary racing of the engine under the pretence of adjustment.

11. No tinkering with the engine when it is running well.

12. One set of accumulators to be upon the charging-board, the other two sets upon the car. There is no excuse but carelessness for a discharged accumulator.

12. In cold weather, the water to be drawn off every night.

13. Tyres to be kept fully pumped and tried by the gauge. All small cuts to be attended to immediately.

14. Cleanliness the supreme rule both in the car and the house.

It is not difficult to insist upon these rules in a well-found stable ; it is exceedingly difficult to make them effective where the stable is old and earthy, and of the thatched-roof

order. Some country stables are terrible places in which to house the modern car—the floors of earth, the roofs of straw and timber, the walls reeking with damp. A more unsuitable home for delicate machinery could not be imagined, and do not let us forget that those who contemplate keeping a car under such conditions are taking grave risks. For my part, I would say, make an end of the business at once and either buy one of the specially constructed iron buildings or rebuild your stable *de novo*. You will never have satisfaction until you do. Your car will perish in such a place—your loss must be considerable. And what can you expect of your man when you give so little? The best driver that ever handled a wheel might despair under the circumstances I have named.

For warmth, be sure, and dryness are the first conditions necessary to the motor stable. Christmas will be coming anon, and with Christmas the frosts. How are you to keep frost out of such a place? And remember, although you make it a rule to draw the water from your cylinders directly the first nip comes, you may be caught napping after all and a hundred pounds' worth of mischief done. Spend the money on the stable you mean to build. Put up a commodious brick house, the floor of concrete, the roof sound, electric light if you can have it, and a charging-board for your accumulators. Bring a powerful jet of water for cleaning purposes, and hot-water pipes to save your machinery. The money, I repeat, is well spent. It is the supremity of folly to house your motor in these ancient barns; even did Queen Elizabeth herself condescend to swear at her grooms beneath roofs so ancient,

## CHAPTER XII

### THE CARE OF THE ENGINE

THE amateur who drives his own car will quickly become interested in its engine. Though he have no mechanical bias, he will, nevertheless, quickly find himself discussing things he had not so much as heard of three months ago; while in a year he will be a very dictionary of motoring argot.

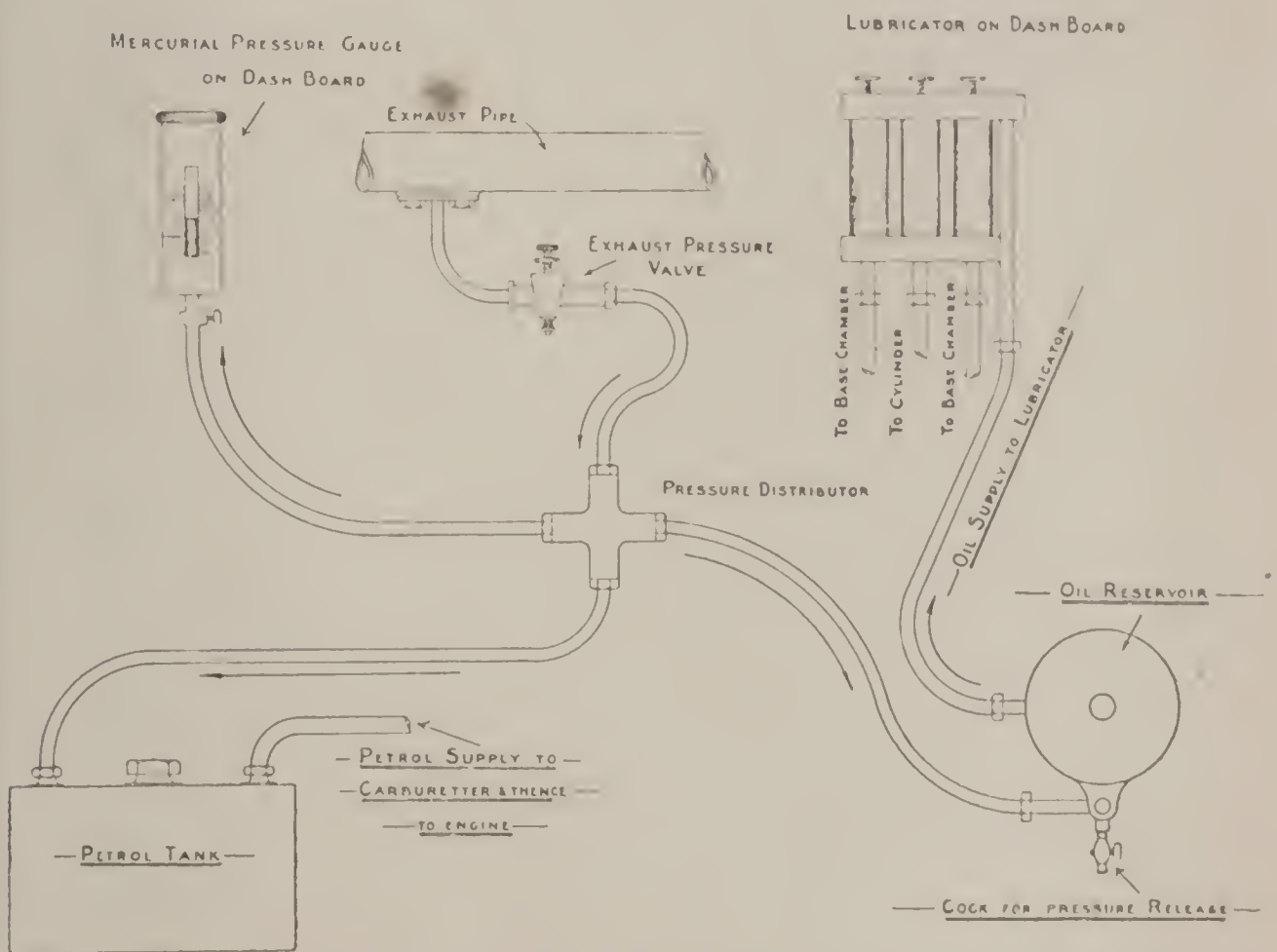
I am making no pretence in this book to deal with other than the elementals of motor engineering. It is well enough for the few to be able to expound in quadratics the precise value of this or the pressure equation of that. The born engineer, who must be squaring something, will present you with r—n's enough to make a Smith's prizeman happy for life, if you lend him an ear for five minutes or so. But this, surely, has no part or lot in the mere amateur's diary. We like to know the first principles of our engine. It is a pleasure and a strength to be able to keep that engine running and to weather the storms that a romancing chauffeur would conjure up for us. No man is really master of his car until he can trust himself alone with it; and to trust himself alone wisely implies some little experience. I shall endeavour in this chapter to show what are the common troubles of a later-day motorist; how they are to be overcome, and what is the meaning of them.

Let us, then, take the car from stem to stern and catechise ourselves, as we go along, upon the various ailments we discover and their remedy. Obviously, before we attempt to start up our engine we shall have done certain things; and the first of these will have been to lubricate the machinery freely. There is nothing so important as lubrication in the whole motor curriculum. You can over-lubricate a car to



your inconvenience; but you can under-lubricate it to its ruin. So we shall spare neither grease nor oil. And first we shall fill up the main lubricator upon our dashboard. In the modern car the oil pump is very largely taking the place of the Dubrelle form of lubricator; but whatever the system may be there will be one main oil-tank to fill, and that we shall fill with such oil as our makers recommend.

No man, I repeat, can be too scrupulous upon this point.



The Lubricating System on the Daimler Cars. Mercurial Pressure-gauge on Dashboard.

I have seen many a good car hopelessly ruined by want of lubrication. One of the prettiest little 15-h.p. Orleans that ever I sat upon was wrecked by its owner on the first day he had it. He drove it to Norwich and neglected to watch the drip feeds upon his dashboard. As a matter of fact, the lubricator was not working, and by the time he reached Newmarket his engine had seized. So, you see, we have not only to fill the lubricator, but, having started our engine, to watch it for a while to make sure that all is well with it.

Having done so much, what is the next course? My own practice is to go on immediately to the gear-box, to open the lid of it and to see that the wheels are well covered with a mixture of oil and grease, or with gear-oil alone, if that is to be preferred. There is no fixed rule for oiling either the gear-box or the differential. You must keep them filled as occasion requires—the differential to the level of the cock, the gear-box well above the shafts. Your clutch, you will find, if it be of the old-fashioned leather cone variety, will probably have a grease-cup attached; and this you must fill every morning and screw down to force the grease into the bearing. The same rule applies to the grease-cup upon your pump, and to that upon the universal joint.

You will now take your oil-can in hand and begin the minor tasks. Starting at the fan, see that its bearings are properly lubricated. If there be—as there should be—proper lubricators for your steering-gear, give them a good supply; pour a little oil into the commutator and see that the old oil is first cleaned out; use oil freely on all joints of the radius rods, the brakes, the throttle and the ignition motions. Do not forget the magneto; and by no means overlook the fact that every spring upon your car will (or should be) fitted with a lubricator, and that oil should be used freely upon the shackles.

For my part, I think it an excellent thing, when a man is buying a car, that he should get the foreman of the works to go over the lubrication system with him, thus teaching him the situation of every grease-cup and of every oil-hole that might otherwise remain undiscovered. And when this is done the owner should make a table for himself, noting what are the daily needs and what the need of circumstance. The hubs of the front wheels, for instance, should be looked to about every five hundred miles and refilled with oil if necessary; but you might ruin a clutch by leaving it for a single day unattended. If a table of this kind were to be drawn up by me, I should make it very brief. Thus it would run:—

- (1) Fill every greaser every day and give it half a turn to force the lubricant in,

- (2) Wherever there is a hole for oil, inject oil daily.
- (3) Look at your differential and gear-box once every three days at least and keep them filled to a given mark.
- (4) Oil your front wheels (or look to them) every five hundred miles.

We have now oiled our car and are ready to fill up with petrol. We shall have a good filter in the tank, of course, and also, if we are wise, a Bowden filter in the petrol pipe itself. There is nothing more troublesome than water or grit in our carburettor; there is no surer prevention than a good gauze filter in the tank and a Bowden filter in the pipe. Of these we assume the existence, and, making sure that the petrol tank is full, we shall next look to our radiator. This should be filled with distilled water, obtained from our chemist at sixpence a bottle. I myself think it impossible to over-estimate the importance of such a practice. The ordinary London water, taken from the tap, is about as bad for our radiators as anything could be. Just look at the condition of the common kitchen boiler when Make-a-job, the plumber, comes to clean it for us. The pipes are furred to an extraordinary degree, as we know. Notwithstanding their diameter, the circulation of the water is sometimes almost stopped, as the family is well aware, when "pa" says weird things in the bathroom. Imagine, then, what must be going on in those countless tubes of our radiator. Why, it is amazing to me, not that we have radiator troubles, but that they are not universal. And all this, remember, could be remedied by the regular use of distilled water, which will cost us two or three shillings at the worst. So, let us be wise in time and refuse to contemplate the day when we shall be washing out our tubes with caustic soda and bestowing anathemas upon our pump. Keep the radiator filled with distilled water, and the car from the shops.

When a man has done these things, when he has turned on his petrol, tickled the float of his carburettor and made sure that the spirit is flowing, when he has switched on his ignition and put his starting-handle into engagement, he is ready



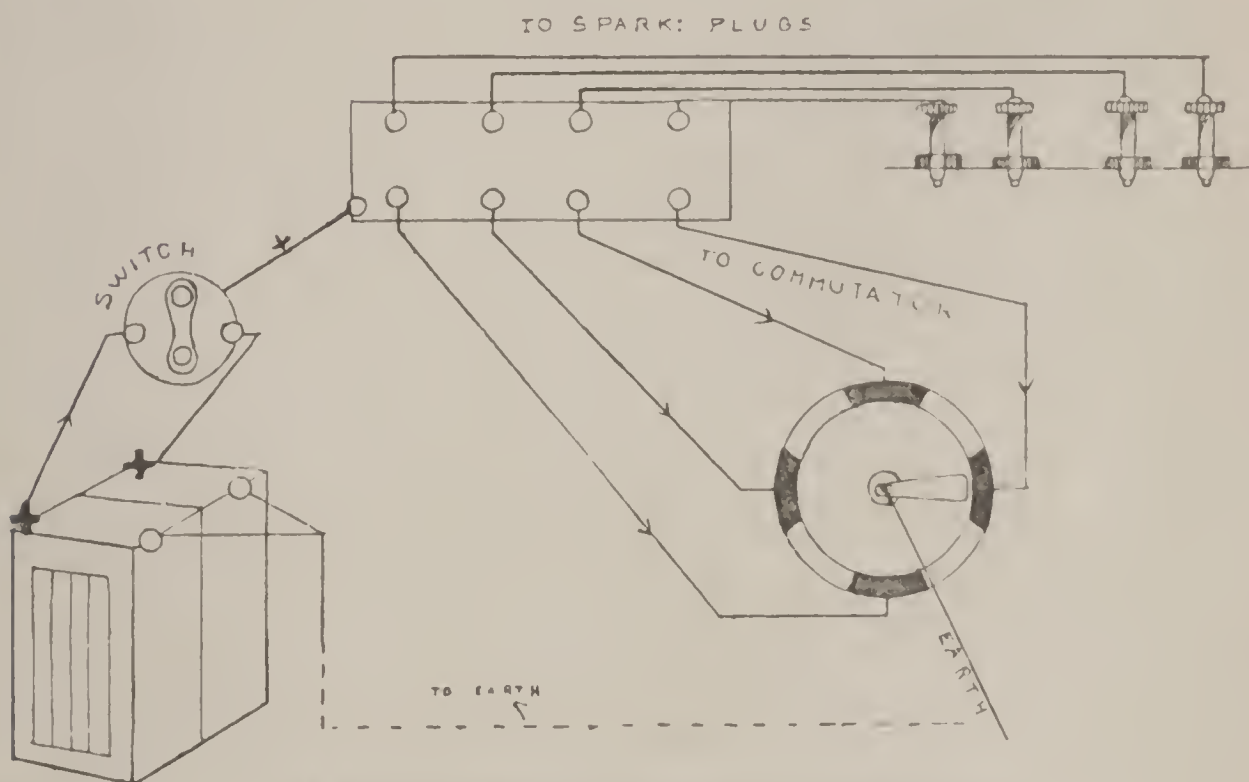
to set his engine going. Should it be a bad starter or have been idle for some days, he is wise to delay the switching on of the ignition for some minutes and to practise other methods. Let him, for instance, open the compression taps at the cylinder heads and inject a few drops of paraffin into each orifice. He should then turn the starting handle smartly, easing the pistons and sucking the petrol into the cylinders. He may now switch on the ignition and start in earnest. If the compression be good, his ignition in order and all the accumulators charged, he will probably start at the first turn. Should he be driving on magneto, however, he may need some dozen rapid revolutions of the crank-shaft before he will get his engine going.

Let me emphasise this point particularly. I see men fiddling about with their carburettors and their ignition when all that is needed is a brisk turn at the starting-handle. The modern engine starts readily enough when it has once been warmed up. It is the beginning in the early morning which alone should be troublesome. Do not, I say, at this time be too ready to anticipate difficulties. The oil in your cylinders is stiff, the cylinder walls themselves are cold, the magneto may need a rapid revolution to give you the necessary spark. So prepare for a few minutes' active exercise, keep your ignition retarded and turn the handle for all you are worth. If she does not start upon this, then advance your ignition some notches and try again; but you must be careful not to advance it overmuch, for the risk of a back fire is always there, as many a driver has found to his cost.

It is when the engine refuses to start altogether that the mere amateur is often flabbergasted. All the knowledge that he has got out of books comes whirling into his brain to confuse and appal him. Grit in the carburettor, water in the petrol, sooty plugs, accumulators run down, magneto dirty, valves stuck up, compression bad—what, in heaven's name, he asks himself, is a mere amateur to do?

Let us endeavour to reassure this good fellow. If his engine really will not respond to a brisk turning of the

starting handle, then it is time for him to begin to look round, but to look round not vaguely but with method. Should he have accumulator ignition, I recommend him instantly to turn to that, and let him turn according to the rule. To begin with, he should open his commutator and manipulate the crank-shaft until one of the contacts is made. Now let him listen to the coil. Is it buzzing? For if it be silent, he has a short circuit, and no current is entering it. What, then, is the matter now? I reply the accumulators



A common method of wiring a four cylinder car.

must be the matter, or a defective switch. Take your voltmeter and see what current you have in your accumulators; examine the terminals. If there be four or six volts, as the case may be, you may cease to think of accumulators and should go on to the switch. Is there a short circuit there? Are the terminals and wires quite clean and screwed home? Is the switch loose in any of its joints? Should these questions be answered favourably, our next thought must be for the earth wire—the wire from the negative of the accumulator to the chassis. Is the terminal of this clean and properly screwed down? How many cars have I seen brought to a stand by the breaking away of the earth wire or a defective

connection there! Look to these things and make sure of them. For if you have current in your accumulator, if your wires are not broken, if the earth connections are sound and the switch is all right, then you must get current through your coil.

Let us take the second case, where, upon contact being made in the commutator, there is buzzing in the coil, but still no result. We must have our plugs out this time and test them. Take a plug at hazard, get some one to turn the starting handle for you, and lay that plug gently upon the cylinder, so that contact is made between the wire and the iron of the cylinder head. Now watch for a spark. If it does not come, one of three things may be the cause. The plug may be dirty, covered with soot or oil; the points of it may be too close together; or the secondary wire itself may have a faulty terminal. Clean the plug first, and take no risks that way. Try a common visiting-card between the points of the plug, and if it just fits they are about right for accumulators. Half a millimetre is the proper distance. Should your ignition be magneto, however, remember that  $\frac{1}{4}$  of a millimetre is the correct space. Measure this upon a scale if your eye is not accustomed to gauge it; and when you have cleaned your plugs and looked to your points, then go back to the terminals upon the coil. See that these are clean and well screwed home, and it is a hundred to one that they are in order.

I am, of course, assuming that when you clean the plugs you also examine them very carefully lest any should be damaged. In the case of one cylinder persistently missing fire at the plug and the others being in order, it is large odds either that the wire from the coil to that contact is broken or that the plug itself is deficient, and should be immediately changed. Sparking-plugs are of many varieties, but their habits are various. I have run the cheapest of them for six months—the dearest for three days. There is no rule whatever in the matter, no wisdom but this—to change your plug whenever that particular cylinder begins to give you trouble.



Writing to me upon this interesting subject of accumulator ignition, Messrs. Peto and Radford, undoubtedly the greatest experts we have, were good enough to send me the following notes. I do not think that I can add anything useful to them, nor should I attempt to amend so concise a statement :

“The electrical ignition on an automobile fitted with an induction coil and accumulators depends for its energy upon the accumulator, and therefore it is absolutely necessary to give the accumulator proper attention, and to see that it is kept properly charged and in good working condition before anything else.

“Many people neglect this most essential apparatus whilst giving careful attention to all other working parts of the car, with the result that this form of ignition is often unjustly abused, when it is really the most simple and reliable, besides being the most easily fitted and elastic system in many ways.

“First in importance comes the care of the accumulator. The accumulator should be looked upon as a box containing a store of electric energy, which will leak away across a wet lid or through a layer of dust, and at the same time will cause corrosion of the terminals if they are left in a wet and dirty condition.

“Therefore the top of the cells should be kept absolutely clean. Any spilt acid or spray should be wiped off, and all overflow removed by wiping the top over with water and cloudy ammonia to neutralise any acid. The terminals should be kept quite clean, and if any corrosion be apparent it should be removed by sponging with warm water and ammonia, followed by water only. When quite dry the terminals, rubber collars, and lead supports should be covered with vaseline, except on the parts which have to make contact with the wires.

“Many people misunderstand the cause of corrosion on terminals, thinking it is due to the action of the acid only. But this is not the case. The excessive corrosion which sometimes takes place on a positive terminal, eating part of it away and piling up a growth of brown oxide, is due to a process similar to that of electro-plating. The leaking current

of electricity, assisted by the acid, is decomposing the metal of the terminal, and it is no easy matter to arrest this, once it has obtained a firm hold.

“Cleanliness and care will preserve the accumulator from loss by leakage. It is also an important matter to see that the plates in the cells are not damaged by discharging them to a point which is injurious. The normal voltage of an accumulator cell is 2·2 volts; and when this has fallen below 1·8 volts, the condition of the plates is such that they are readily acted upon by the acid in an injurious degree unless they are recharged as soon as possible within reasonable limits. If an accumulator is run down, and then left on a shelf for some weeks, it will be quite ruined as a good battery. The acid in accumulators does not require renewal when the cells are re-charged; but it is important to keep it up to its correct strength from time to time. Constant charging has the effect of dissipating the hydrogen in the acid, and after some time the acid loses its strength and requires bringing up to the correct specific gravity.

“Sulphuric acid used for some small accumulators should be of good quality, as sold for electrical purposes, and should be mixed with distilled water to a specific gravity of about 1·200°—this being roughly one part acid to four and a half parts water.

“To obtain complete satisfaction with accumulators the following rules should be observed:

“(1) Purchase a first-class article in the first instance, giving preference to ebonite cells instead of celluloid, which is not a good material for storage cells, except that it has the advantage of transparency.

“(2) See that the acid when first put in is of correct strength and quality.

“(3) See that the charging current is not too high, and that the battery is well charged until the positive plates are a dark chocolate colour, in direct contrast with the negatives, which should be a bluish grey. When fully charged and on open circuit, that is not discharging, the voltage may be as high as four and a half, with well-charged cells.



A Striking Daimler Limousine.



*Photo by Campbell Gray.*

The 15-h.p. Panhard Landaulette (open).





“(4) Keep the cells scrupulously clean, especially on the tops between the terminals, and remember the stored electricity will leak across if you give it a chance to do so.

“(5) Do not use the battery after it has been discharged to 1·8 volts per cell, unless you are on the road and unable to help it. Get the battery recharged as soon as possible after you have found it to be run out.

“(6) Keep the strength of acid up to the mark, and never put ordinary water in the cells.

“The induction coil has, as a rule, only one part that requires a certain amount of attention, that is the platinum contact points between the trembler blades. These should always be kept filed true and perfectly flat when they have been worn and burnt sufficiently to spoil a perfect contact.

“Filing a pair of contacts flat is not so easy to some people as to others. It depends on the mechanical talents of the operator. But a little practice and trouble should enable every one to adjust the tremblers sufficiently to proceed, even if skilled attention may be required later.

“Induction coils should be kept dry, and should not be placed in a position where great heat is present, as they are filled with wax.

“The induction coil takes current from the battery, the amount of this current being chiefly dependent upon the resistance of the primary winding of the coil. This is a fixed quantity, and the current which passes round the primary winding varies from  $1\frac{1}{2}$  to 3 amperes in different coils.

“Contact breakers should be periodically cleaned and inspected in order to ascertain whether the segments are much worn. When these are worn down the burr of metal on the edges will cause a partial short circuit which can be very troublesome, as it is difficult to detect.

“Contact breakers with roller contacts should always be kept well-oiled and free from deposits of thick grease, which may spoil the contact.”

It would seem to be, then, that our ignition by accumulators chiefly depends upon the state of the accumulators

themselves, of the terminals, and of the sparking-plugs. We have yet to consider the coil itself, and the niceties of adjustment it demands. Some men have a positive instinct for adjusting the platinum screws. Their ears can detect in a moment that peculiar buzz which denotes the highest point of efficiency. Others never seem to detect it, though they may be drivers for years. And yet I say without hesitation, that should you possess electric ignition alone, 90 per cent. of your success as an amateur driver will depend upon the nice adjustment of your trembler blades.

Perhaps the best practice is that which we get when quite alone. I think a man should try this adjustment by himself, running up the gamut of the scale and listening to all the various sounds which the coil will give out when the platinum screws are raised or depressed. Remember that the higher the note given out by the trembler the greater the efficiency and, in consequence, the speed of the engine. As a start, screw the blade down until there is no buzzing at all; gradually release the pressure upon it until you hear the welcome sounds, and go on releasing it until they cease again.

You will now begin to understand that the coil makes music for you; that its low vibrations are of no particular use; but that its higher notes are what you want. You may, in some measure, take the engine for your guide. Cause two of the coils to be put out of action, and experiment with the other two. Depress or raise the blades, and hear what the engine does during the process. When you have made the experiment to your satisfaction, then, if you can, ask some old driver to adjust the tremblers in your presence; listen to the sounds that please him, try to understand the rhythm of the engine and what produces it. Should a cylinder be out of tune and the trembler blade refuse to bring it back, then be sure that the trouble is in the plug, the points of which may be too far apart or too near.

Experience alone can guide you in this. If the compression of any particular cylinder is unusually high, the points of your plug must be closer than for a lower com-



pression. This is a fact too often overlooked by careless chauffeurs. There is another point. Do not forget occasionally to reverse the direction of the current through the system. Your positive from the accumulators goes, we will say, straight to the switch, your negative to earth. Every alternate week let your positive go to earth and your negative to the switch. This will prevent that wear upon your platinum points which otherwise cannot be but a source of trouble. Some men are always having to file the platinum points true because they never think to reverse the direction of the current.

This is a little thing, and yet it is astonishing how much annoyance it will save us. I would have the amateur make a note of it. So, also, would I beg him to be careful to whom he trusts his accumulators when they must be charged. If he can have a charging board in his own stable, so much the better. These are not as common in London as they might be ; and they are not as common for the simple reason that many of the London companies deliver an alternating current to us. This means to say that if we would charge our accumulators at home, we must purchase a transformer—somewhat a costly implement, but well bought if we are to rely upon ignition by accumulators. My own plan is to seek out an electrician of standing and to offer him a double fee if he will keep my accumulators upon the board at half the amperage (that is at about an ampere) usually employed and for double the number of hours. It is wonderful how cells thus charged will keep their current.

Too often do we see a good accumulator ruined by the ignorance and the haste of the man to whom we entrust it. Of all mischievous places that I know in this respect, some of the great electric-light stations have been, within my experience, the worst. Here they often charge our accumulators straight from the dynamo ; sometimes they are not even at the pains to send the current through them in the direction it should go. I have had cells returned to me with absolutely no charge at all in them ; others so charged that they were exhausted before I had driven fifty miles ; others again, burned

and seared by the careless handling of the wires from the dynamo. These sins are rarely committed by the electrician in a small way of business. Seek out such a one in your neighbourhood and give the work to him.

Of course, if you have a direct current from your company, it is the simplest thing possible to charge your own switch in your establishment. Should you know nothing of electricity, get an electrician to give you five minutes' instruction and to rig up a little charging-board for you. He will put the proper resistance in the circuit. However clear directions may be, do you know nothing of electricity, you are likely to bungle the thing, and to bungle it badly. So I say, if you would charge at home, get an electrician to fix a charging-board and the rest is child's play. You have but to couple the wires to your accumulators and to leave them there for ten or twenty hours as the need may be.

Writing some months ago of magneto ignition I find that I made the following notes:

"I am inclined to recommend a neglected high tension magneto as an excellent substitute for a gymnastic course. It is astonishing what different reports one hears of this high-tension ignition. Some men will tell you that they can invariably start their cars by half a turn of the handle; others speak of exasperating performances which would have done no disgrace to the nomadic monkey upon a barrel-organ. The truth lies, as did David Balfour's politics, 'betwixt and between.' There is nothing, I suppose, so obstinate as a high-tension magneto which is not tuned up. There appears to be nothing more satisfactory when the tuning has been done.

"The great thing to remember when dealing with a high-tension magneto is that cleanliness is indispensable. Any dirt upon the contacts is likely to be disastrous. In my experience the most fruitful source of trouble is at the platinum points; these will not deal with you as kindly as our old friends upon the simple 'make-and-break' which Darracq knew. Not only must the platinum points upon

a high-tension magneto be absolutely clean, but they must be filed dead true one with the other. A point which is not quite flat will give a limited contact which seems ineffectual with a high-tension magneto. Nor is it enough to attend to your contact-breakers. Every brush that collects the current must be both clean and properly adjusted. It is the sum of these little things that makes the successful high-tension.

“Some of the difficulties I have hinted at undoubtedly are to be attributed to plugs. Those who are new to high-tension magneto overlook the fact that the points of your plug must be closer together than in the older ignition. Professionally they tell you that the correct distance is  $\frac{1}{4}$  of a millimetre ; but if you can carry the distance of half a millimetre in your mind, it is good enough for a rule of thumb. A spark from a high-tension magneto is intensely hot, but it has not the bridging capacity of an accumulator spark. People who forget this will never start their cars easily.

“For my part I do not believe in any form of magneto ignition which is not accompanied by the reliable accumulator and coil. Low-tension, as fitted to Mercédès and other cars, has been upon the whole uncommonly successful ; but even this is not always sufficient when the engine is quite cold. The great advantage of low-tension magneto is that you need not be so very particular about keeping it clean. It is better, of course, to keep it clean ; but a certain amount of soot and oil seems to agree very well with its constitution and to work no mischief.

“In a twelvemonth's experience of low-tension magneto I had but one failure of the soap-stone plugs ; but the tappets themselves were always giving trouble, and it was exceedingly difficult to synchronise the firing. This difficulty does not occur with some tappets, and the Mercédès people speak of little trouble under that head. Where very high-speed engines are concerned there can be no doubt whatever that the old plain 'make-and-break' accumulator and coil ignition is without a rival. I have little doubt that the extraordinary efficiency of some of the earlier Darracq engines was largely due to the



simple 'make-and-break,' while Count De Dion has nothing but praise for it. At the same time it is most exasperating to run any risk of ignition troubles nowadays, and nearly every car with any claim upon us at all is fitted with two ignitions.

"The good old times, when we were hung up by the roadside, to the scorn of the horsey person and the delight of the small boy, owed much of their sadness to ignition. Those were the days when we fired our cars by tube and petrol. I can remember burning an excellent vehicle upon the St. Albans road to the immense pleasure of a variety of urchins and the satisfaction of the owner, who was tired of the business. You often had a fire under your bonnet in the old tube days, and perhaps were not sorry if the weather were sharp. Those were the times when we slept out under motor-cars, and rarely accepted an invitation to dinner that did not give us forty-eight hours to get there."

## CHAPTER XIII

### THE CARE OF THE ENGINE—*continued*

WE do not sleep under our cars nowadays, and the new habit is chiefly due to the fact that we have made a science of ignition. But great as our progression has been, I am inclined to think that finality is not yet. This high-tension ignition, of which all the world has been talking during the year 1907, may be victorious for the moment, but that triumph is to endure I beg leave to doubt.

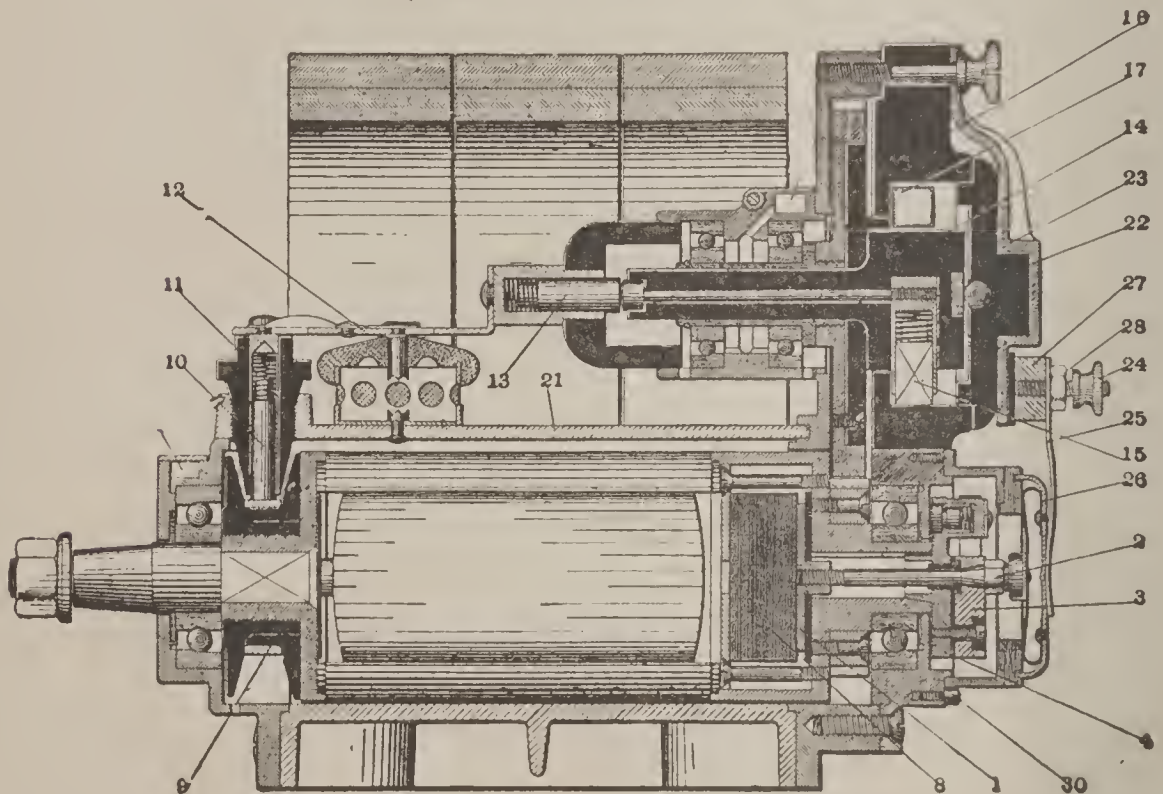
If it does endure, it will be largely owing to some such type of magneto as the D.4, of which Messrs. Simms-Bosch are making a speciality in these later days. They have realised wisely enough that there were starting difficulties with the older type; they admit, perhaps, that electric ignition has, hitherto, been a necessary stand-by; and now as a consequence they offer us a magneto which must be the last word for the year 1907.

This type is of a rotary armature order. If I had to explain it to a novice, I should tell him first the simple fact that if you magnetise a piece of iron and bend it in the shape of a horse-shoe, there is magnetic force passing between the two ends or poles of the contrivance. Now insert between these ends an H-shaped piece of soft iron, upon which you have wound a short length of thick and insulated wire, and a long length of thin and insulated wire. This would make an armature for us; and if we are able to mount it in suitable bearings between the horse-shoe magnets and there to revolve it so that it cuts the force passing from one pole to the other, then we can produce an electric current of great intensity.

We have our current, then. But how are we going to lead it to our cylinders? The armature, you see, is revolving. You cannot take a wire straight from it to a plug. No, but you can cause a carbon brush to press upon the spindle of the armature, and that will collect your current for you.

### LONGITUDINAL SECTION

*(One-third actual size)*



- |                            |                                 |   |
|----------------------------|---------------------------------|---|
| 1. Brass plate.            | 10. Carbon brush.               | 19. Fibre roller.                           |
| 2. Contact-breaker screw.  | 11. Carbon holder.              | 20. Timing lever.                           |
| 3. Platinum screw block.   | 12. Connecting bridge.          | 21. Dust cover.                             |
| 4. Contact-breaker disc.   | 13. Contact carbon.             | 22. Cover.                                  |
| 5. Long platinum screw.    | 14. Rotating distributor piece. | 23. Triangular clamp.                       |
| 6. Contact-breaker spring. | 15. Distributor carbon.         | 24. Nut for switch wire<br>(short circuit). |
| 7. Contact-breaker lever.  | 16. Distributor disc.           | 25. Spring for fastening<br>brass cap.      |
| 8. Condenser.              | 17. Metallic segments.          |   |
| 9. Slip ring.              | 18. Contact plug.               |   |

Type D.4 Simms-Bosch Magneto.

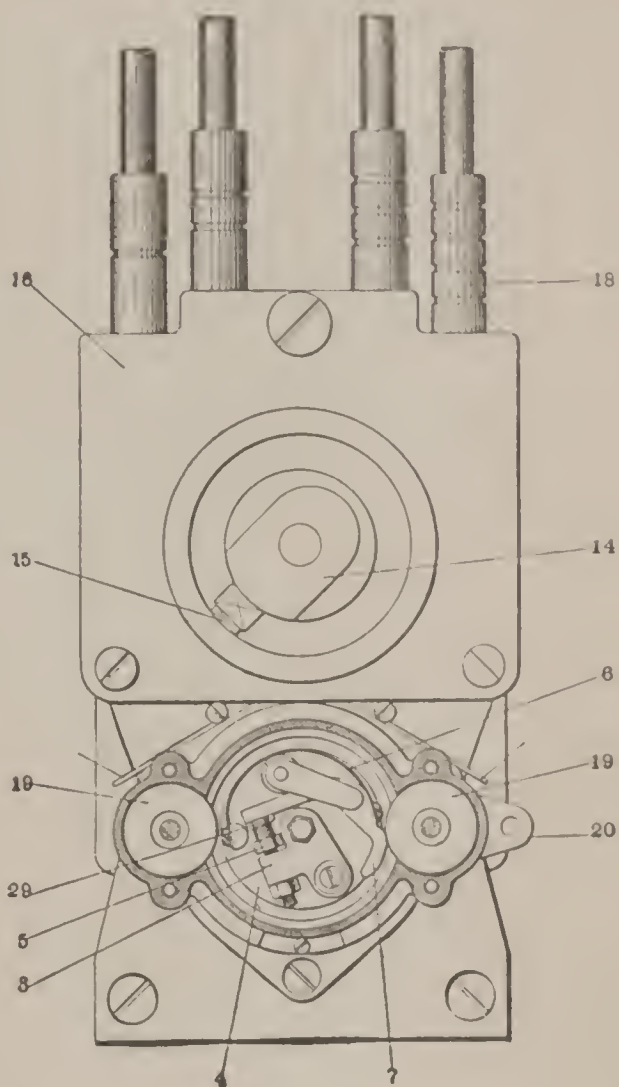
This the makers do ingeniously by such a brush and a brass ring, to which one of the wires is attached, catching the high-tension current in this way, but leading the low-tension current through a tube to the contact-breaker. The latter contrivance does for us exactly what our trembler blade upon the coil has been doing hitherto. It breaks



the low-tension current and so causes a high-tension spark in the cylinders. It is quite a simple little contrivance, consisting of a rocking lever with a platinum point, another platinum point for this to rest upon, and a pair of cams to lift the lever each time the spark is necessary. For the rest there is a condenser which consists of alternate layers of tinfoil and wax paper; but this is not for the novice. He may be content to know that the condenser acts as a kind of storehouse, opening the door to the current when it is checked at the contact-breaker, and giving it out again when contact is resumed. His chief concern must be with the platinum points themselves, with the cleanliness of the distributor, which delivers the current to the cylinders in their turn, and, above all, with the correct timing of the machine.

The platinum points first, if you please. We must keep these filed dead true if we wish to get the best results from a Simms-Bosch magneto. Our coils will often run with the platinae sadly worn; but do not hope for such luck when we are dealing with magneto ignition. There we must have an absolutely flat contact, everything must be true and clean. If this be so, but one trouble can arise in

BACK VIEW



- 26. Brass cap.
- 27. Brass block for fastening spring of brass cap.
- 28. Fixing bolt.
- 29. Short platinum screw.
- 30. Stop screw for timing lever.

Showing the Contact-breaking Mechanism  
(Simms-Bosch Magneto).

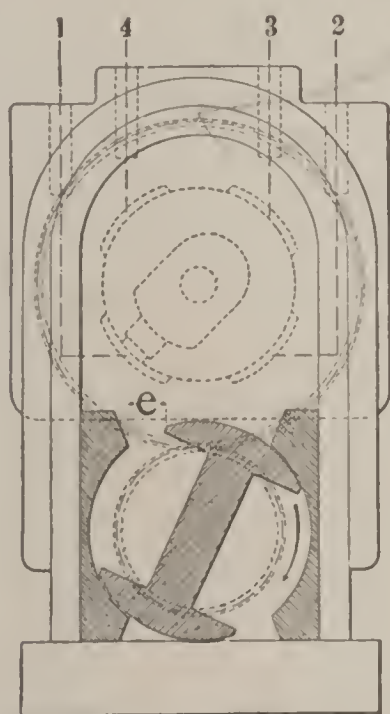
this place, and that will be from the sticking of the lever on its bearing. This bearing is a delicate little affair, and until it was properly insulated it gave much trouble. Messrs. Simms-Bosch are keenly alive to this, and in their new patterns of the D.4 machine the trouble is not likely to recur. Indeed, this type has practically given no trouble at all; and if the driver will but be careful to keep oil out of the distributor—which is our second point—to see that the brush is well home and the contacts true, the day will be rare when he will be held up.

The machine has been made to drive at the same speed as the engine-shaft for no other purpose than ease in starting. It is Messrs. Simms-Bosch's contention that with a D.4 and a well-kept engine there is no need whatever for an accumulator as a stand-by; or that if there be, then it is the easiest thing in the world to adapt their own magneto to the double purpose, and so to wire it that an accumulator can be switched on at any moment.

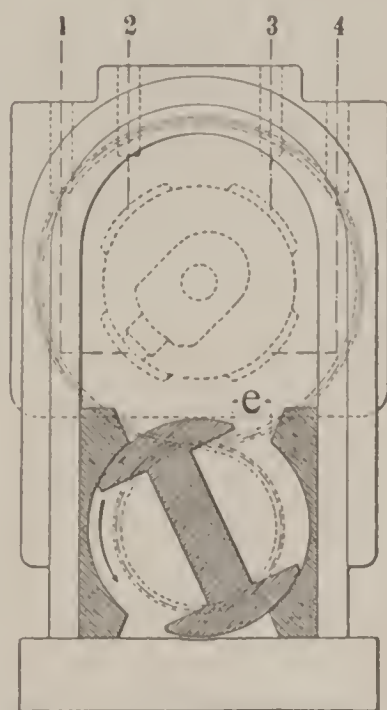
We summarise the magneto, then, by saying—keep the platinums flat and filed true, keep all oil out of the distributor, put but a few drops of oil in the ball races, and this but once every three months, use Messrs. Simms-Bosch's own plugs, and you are likely to have good results. These truths apply with but little emendation to other systems upon the market—the Eisemann, the Fuller, and many that have recently won attention. There is always a contact-breaker to be properly adjusted, carbon brushes to be kept in good contact, plugs to be well looked after. All this the amateur can do readily enough; what he will not be able to do, until he is master of the system, is to time his engine correctly. This I do not advise him to attempt until he has had considerable experience. On the other hand, there is this to be remembered, that some accident on the roadside might throw his magneto out of gear; and if he could not then reconnect it correctly, he certainly would not go home in that particular car. So I am tempted to give a few plain directions for the timing, say, of this D.4 type, and to leave it to the common sense of the

individual to apply the rule to whatever magneto he may be using.

The magneto driving-gear has become disconnected, I say, and the man at the roadside has to start again. What has he first to do? Just this, to turn his crank-shaft round until the first of his four cylinders has its piston at the very top of the stroke. This he can discover by putting a piece of wire through the compression tap, or if not there, by unscrewing one of the valve-caps and getting at his piston that way. He will now look at his magneto, and turn the



Armature revolving Clockwise.



Armature revolving Anti-clockwise.

high-tension distributor to the piece of brass marked No. 1 therein. At this point, the ignition lever being retarded, the edge of his armature should be exactly halfway across the opening between the magnets. One thing, however, he must by no means forget, and that is to ascertain at the outset which way his armature revolves. Is it clockwise or otherwise? This he can tell in an instant from its position and the method by which it is driven. But when he has ascertained the fact, and has seen that the armature, the ignition being retarded, is halfway across the gap between the magnets, then he must go on turning that armature in its proper direction until the platinum points in the



contact-breaker separate. This is the moment to couple everything up. He has now timed his first cylinder, and the time for the others is thereby established.

The great thing to be sure of is that when he has No. 1 cylinder at the top he has the carbon upon No. 1 in the distributor case. If this be not so, - disaster must follow. The cylinders will fire out of order, or, more likely, probably they will not fire at all, because they will not be upon the firing stroke when the spark is made.

I may note that Messrs. Simms-Bosch's own instructions in this important matter are as follows:

"Having fixed the magneto to the motor the pinion is loose on the cone of the magneto spindle. Firstly remove the connecting bridge 12 also the dust cover 21 in order to control the position of the armature.

"Now turn the motor by hand until one of the pistons is at the end of the compression-stroke exactly on the dead centre.

"Then bring the armature of the magneto into position, as shown in the above sketches, clockwise or anti-clockwise, as the case may be, when viewed from the driving end of the magneto. The distance shown in the sketches marked 'e' should be in type 'D.3' 11 to 13 mm., in type 'D.4' 14 to 17 mm., in type 'D.6' 21 to 27 mm. The above figures for engines with 130 mm. stroke give a range of advance of from 10 to 15 mm.

"Having placed everything in position as above described, tighten the pinion on the spindle of the magneto. The greatest care must be taken not to alter the position of the armature while this is being done.

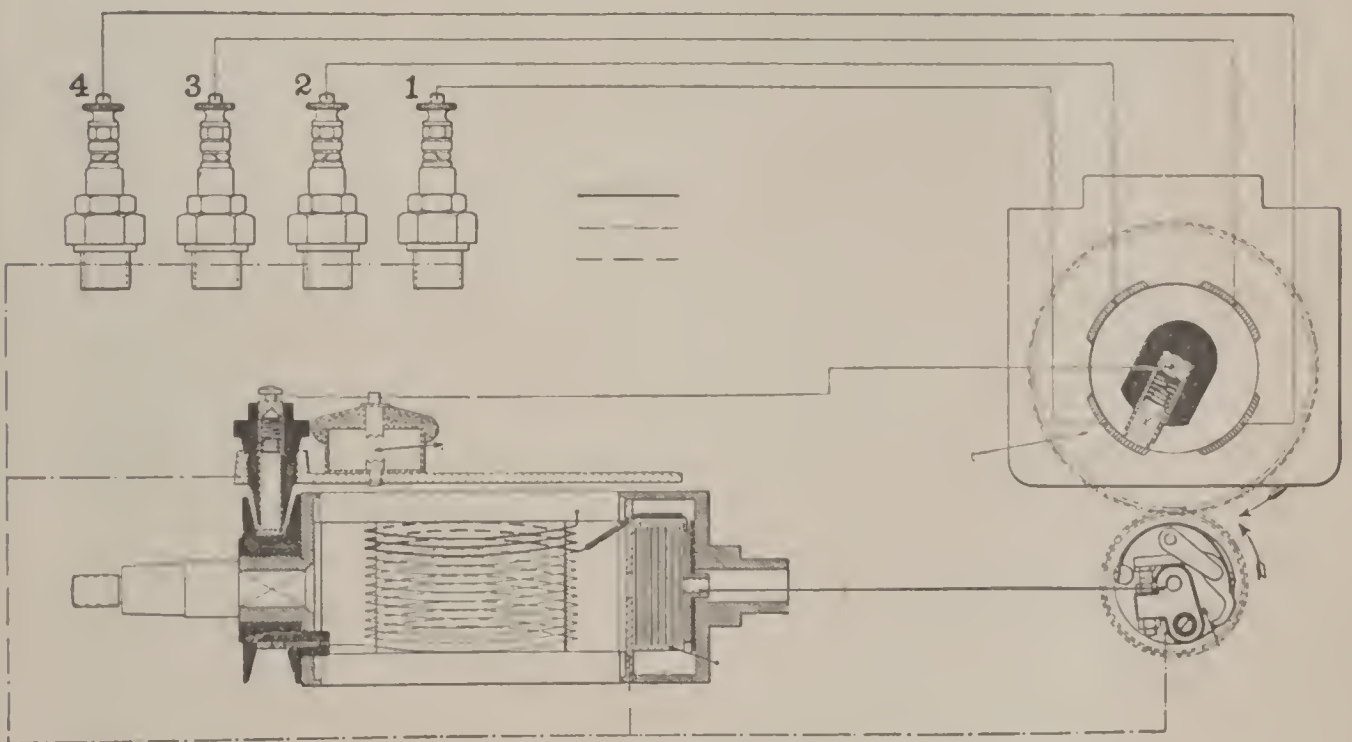
"The connection to the sparking-plugs on the cylinders must be made in the following manner. After removing the triangular clamp 23 and cover 22, ascertain on which segment of the distributor the carbon brush 15 rests. Then connect the corresponding plug-terminal of the magneto to the sparking-plug of the cylinder in which the piston has been placed in position.

"The above sketches show the order in which the contacts

are made on the distributor to the different plug terminals of a 4-cylinder magneto.

"In the case of a 3 or 6-cylinder machine the order is similar. On type 'D.3' instead of two terminals in the centre there is only one, whereas on a 'D.6' between the two outside plug terminals an extra contact exists.

"Having placed the first piston into position corresponding to the segment of the distributor, on which the carbon brush rests, the remaining sparking-plugs should be connected up in the order in which the cylinders operate, but must follow



Drawing to illustrate Wiring of Type D.4 Simms-Bosch Magneto.

consecutively the segments of the distributor according to direction of rotation. Finally replace dust cover and refix the connecting bridge."

This trick of timing is a most useful one for any owner of a car to master, and one he should make it his business to master at the earliest possible moment. I do not care what ignition you are driving upon, it is indispensable that you should be able to set it going when it may have been dismantled, from whatever cause. Nowadays, with plain "make-and-break" accumulator and coils, the timing of the old type of electric ignition is simplicity itself.

My own habit is to mark the number of my cylinders and the order of firing not only upon the coil, but upon the brass of the commutator itself. Thus, if anything goes wrong, I have but to turn on the contacts for any given cylinder and to watch what the corresponding coil is doing. Should the engine be dismantled, then it is sufficient, having got the piston of my first cylinder just about to descend, to mesh the secondary shaft with No. 1 contact as it is upon the point of making when fully retarded.

To me, at any rate, the timing of a low-tension magneto is a more tricky business than any I have yet encountered. Here, as in the high-tension, it is the placing of the armature which is the difficulty. Get this right and all else follows as a matter of course. But it is astonishing how troublesome it is to get right sometimes, and what an alteration a single tooth of a wheel will make. Perhaps the happiest part of the whole affair is that we are so seldom called upon to time our ignition. The modern engine runs for many months without calling upon us to dismantle it. Should the timing wheels be removed, they are removed, I must suppose, by an expert who knows his business and who can replace them as he found them. Indeed, the best makers mark their wheels so that no mistakes shall be made. And when the fly-wheel is properly marked, the rest is child's play.

There are few drivers who can be relied upon to synchronise a low-tension magneto system at the first time of asking. The untrained ear knows that there is no rhythm in the firing, but is often unable to detect the offender; and practice alone is the road to cleverness. Were it not for this difficulty of synchronising the firing, low-tension ignition would, in my opinion, be beyond all question supreme. But the beginner makes a sad bungle of it sometimes when his tappets are troublesome and his ear is out of tune.

In theory, of course, this low-tension ignition is simplicity itself. You have your little dynamo driven from the engine, you carry a wire from it to the switch and to your cylinder. As each wire enters the cylinder it is highly insulated, either by soap-stone or mica or by some other good non-conductor.



It terminates usually in a steel rod inside the cylinder, and here another short steel arm can be pressed upon or withdrawn from it as the rod from the cam-shaft below rises or falls. When this shorter arm is pressed upon the fixed arm the current is made; when it is withdrawn from that fixed arm the current is broken, but the flame of it follows the retreating steel some little way and is hot enough to fire your charge.

A moment's reflection will show you why this simple process may not always give you a perfect rhythm when your engine is running. The rod which comes up from below may be longer or shorter in cylinder No. 1, say, than in cylinder No. 2. You can adjust it ordinarily by a simple screw and a lock nut; but that adjustment must be helped by your ear, and unless your ear be true your firing will not respond. Here, again, our salvation lies in the fact that the best systems of low-tension ignition—the Mercédès, the Fiat, the Richard Brasier, the Beaufort—will run for many months and give us no trouble whatever. Equally good, perhaps, is the Itala, and the Weigel which has followed it.

I know no one who marks the fly-wheels of his engine more carefully than Mr. Weigel. You have but to bring this wheel round to the index to know at once that any particular piston is at its firing point. Then by looking at the little cam which makes-and-breaks, you see in an instant if the adjustment be true, and what you must do to make it true.

This is but an elementary sketch of ignition systems, I fear, nor can I hope to make it more in such a volume as this. Let me, however, say, before leaving the subject, that it is just possible that in the year 1908 we shall see the greatest revolution in the firing of our cylinders that has taken place since Messrs. Simms-Bosch first introduced their magneto to us. And again the invention comes from their famous house.

They are now testing and showing a wonderful magnetic plug which will enable us to have a low-tension system upon our cars without either tappet rods or tappet difficulties. In

other words, we shall have a low-tension magneto and a simple plug to do the rest. Admittedly, it is a weighty plug and of some substance ; but of the intensity of its spark there can be no question whatever. And although, at the time of writing, it has only been tried with success upon stationary engines, I do not doubt that it will soon be perfected, and bring with it a revolution as great as any we have known for many years.

## CHAPTER XIV

### CARBURETTORS

CARBURETTORS are of many kinds—mostly indifferent. Years ago, as I have said elsewhere, we had but one carburettor and were in some ways more fortunate people. The original idea was of the self-help order. We understood that vapour of petrol was necessary to drive our engines, that we must smash this vapour up and add air to it. So we just fitted our motor-bicycles with a square tank, fixed a float above the level of the petrol to do the smashing, and added the air at our will and pleasure by the aid of a small tap in front of our saddle.

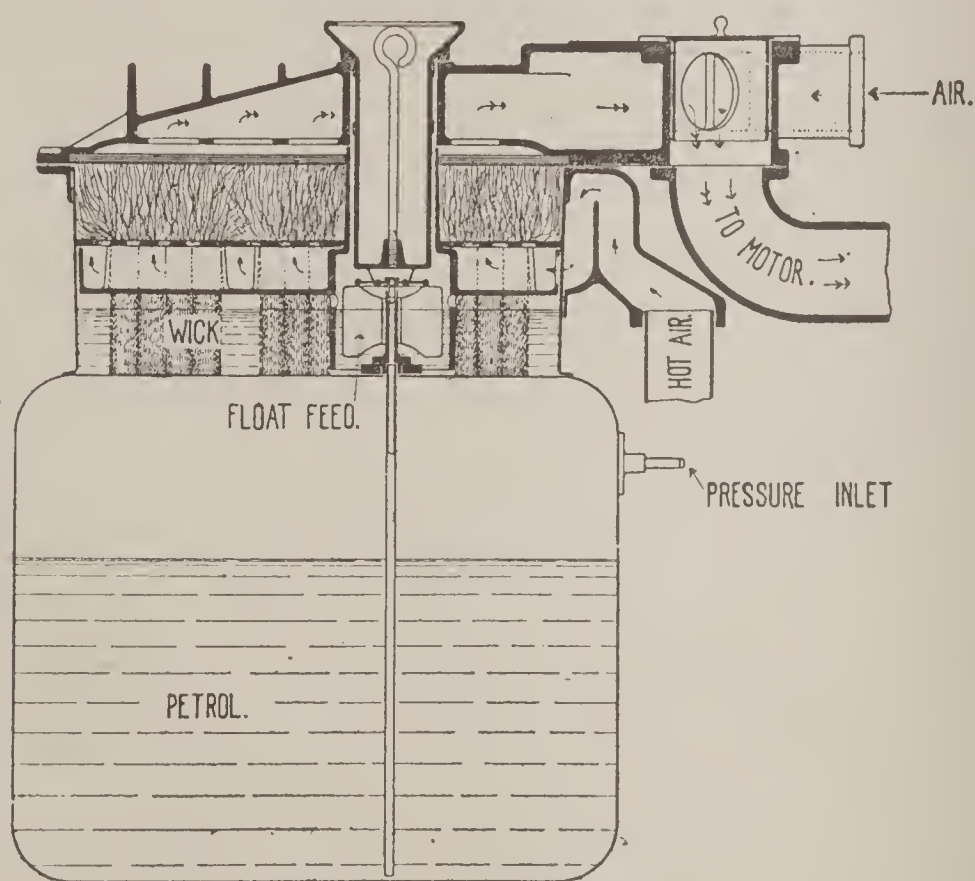
This old contrivance gave capital results. If we had quick ears, we knew at once whether the engine was giving the correct explosive sound. When it failed to do so we began to manipulate the taps until the explosions satisfied us. The thing was called a surface carburettor, and was abandoned with reluctance. I hear to-day that more than one great firm is contemplating its reintroduction in a modified form, while undoubtedly the surface principle has been of considerable use to Mr. Lanchester.

Notwithstanding its merits, I am perfectly willing to admit that the old surface carburettor in its ancient form was quite impossible upon a modern car. It was too clumsy, it required too much space ; it needed too frequent attention to its taps. People began to perceive after a time that the flow of petrol must be regulated to a greater nicety, the vaporisation made more sure, and, if possible, the mixture of air performed automatically. So at once we had the carburettor of the float-feed type.

This consisted and consists of a float-feed chamber—a cup,



in other words, at the foot of which there is a cone-shaped orifice. The interior of this cup is practically filled by the petrol and the float which regulates the level of the spirit. This float, as all the world knows—even the novice—is just a hollow cylinder with a thin brass rod through its centre, the end of the rod being also cone-shaped that it may fit into the aperture at the foot of the chamber. Obviously when petrol enters our cup it raises this float, which, in turn, acts upon the rod through its centre, closing the aperture when the cup



The Lanchester Carburettor.

is full and opening it when the cup is empty. This it is helped to do by two short arms attached to the centre rod and capable of being depressed or raised as the float moves. The contrivance is simplicity itself; a moment's examination of it will make it clear even to the unenlightened.

We have now got our petrol into a cup and must pass it from that cup into a second chamber, where it will be vaporised. To do this we have a tiny passage from the float-feed chamber into a second cup; and this passage terminates in a fine jet fixed in an upright position in the centre of the

second compartment. Through this jet petrol is sucked by the pistons of our engine. It is drawn through in a very fine stream as we can see, and is often, thereafter, broken up and sprayed by a light cone of brass or other metal fixed exactly above the jet. This gives us, of course, nothing but the vapour of petrol; we have, therefore, to add air to it in varying quantities as the needs of the engine go. To this end we make an opening in our second chamber through which hot air can be admitted into the carburettor in fixed quantities; that is to say, this primary opening supplies the necessary minimum of air for our explosions at starting; but when the engine is running very fast we want a great deal more air, and this we get from a second aperture which is opened or closed by a light piston, as the need may be.

Here is a great principle, and one to which the later-day motorist owes very much. We first heard of it in the famous Krebs Carburettor, probably as fine a carburettor in its day as ever was put upon the market. In the Krebs Carburettor a clever designer got at the root of the matter at once. Having provided his carburettor with the fixed air supply, he next contributed a further chamber by which added air could be introduced through the instrumentality of a very light piston and a metal-and-rubber diaphragm. This light piston was naturally drawn down to the engine when suction became considerable. Being attached, however, to the rubber-and-metal diaphragm it needed some considerable pressure to depress it; and upon the suction ceasing the rubber instantly took it back to its original position. When it was depressed it opened additional air ports in the side of the chamber, and through these air was sucked into the cylinder just in the proportion of the engine's need. Here we have the whole story of the automatic carburettor—in many ways, as it would seem, almost the final story.

I am not pretending, of course, that any automatic carburettor is at present a perfect instrument. I do not believe that it can be so. Recall the story of the old surface tank and the constant manipulation of the taps we had to make to procure a true explosion. It is incredible to believe that any

carburettor, however clever its design, can infallibly respond to the atmospheric changes as we meet with them upon the high road. We know that in the old days it was often necessary to give a different position to the taps at the top of the hill and in the valley below. These instantaneous changes are beyond any automatic carburettor yet designed; nor does it seem possible to believe that they will ever be within its capacity. At the same time the automatic carburettor is unquestionably the only one which at present is possible upon our cars, and with its deficiencies, therefore, we have to deal.

Many varieties of this automatic carburettor now tempt us. The moving pistons, giving us extra air, are of every kind and variety, controlled by scores of devices, and exploited by every kind of extravagant claims. In some engines the carburettor has undoubtedly been carried to a great state of perfection—notably in the new *Mercédès* and the famous *Zenia*—but I repeat that the principle of them all is the same, and that when once the amateur has mastered it he should also be the master of his carburettor.

It would be a nice study, I think, to ascertain what proportion of our troubles is due to the carburettor, and what to ignition. While not claiming absolute immunity from road stops by other agencies, I will yet maintain that 95 per cent., at least, of our difficulties are due either to one of these causes or the other. We may, it is true, break a valve spring, smash a differential, strip a gear wheel, or even fracture a crank-shaft; but, accident apart, these things happen so rarely that the modern driver is sometimes almost incredulous as to their possibility. He knows, and he rightly knows, that when his engine stops it is ninety chances to one that either his ignition is at fault, or his carburettor. And so, as I have said, he will make a practice of turning first to the one and then to the other. Let us now follow him when he has located his trouble in the carburettor, and is seeking to remedy it.

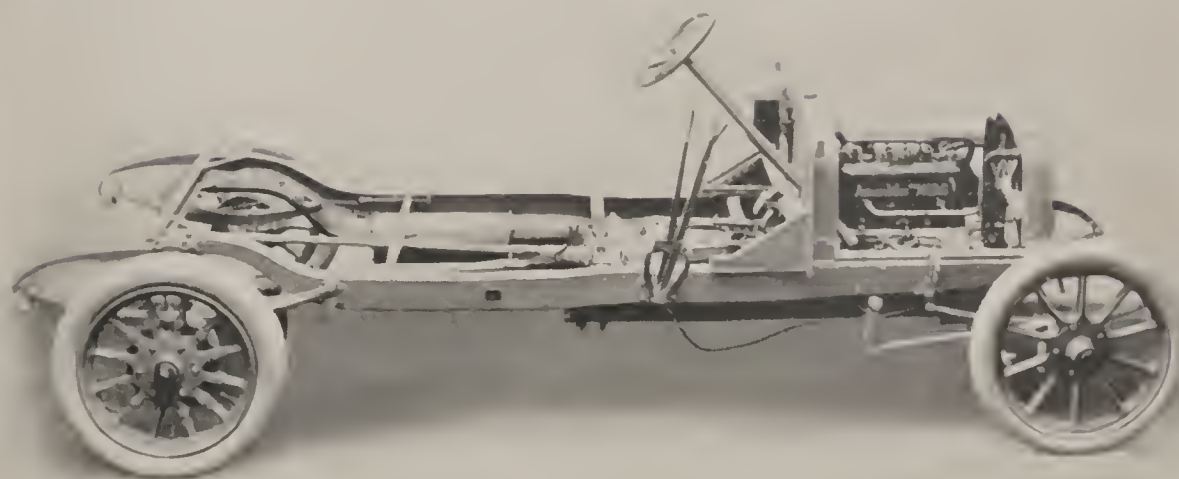
The engine, we will suppose, is misfiring badly—perhaps it is even firing back into the carburettor. Our amateur—not





*Photo by Campbell-Gray.*

A late Spyker Model.



*Photo by Campbell-Gray.*

The 15-h.p. Mors Chassis.



troubling himself for the moment about the possibility of weak inlet springs—will at once see that he is not getting enough petrol, or that he is getting too much air. If he have an automatic carburettor of the common piston type, let him make sure, firstly, that the piston itself is not stuck up or stuck down, as the case may be. Obviously, if it is stuck down, and a large quantity of unnecessary air is being pumped to the cylinder, he will be getting a weak mixture, and consequently a back-fire into his carburettor. Should this not be checked, the carburettor may catch fire, the car be burnt, and the insurance companies made unhappy. Let us not contemplate such an infamy as the reflection of unhappiness upon insurance companies, but at once take down the offending instrument and see what we can make of it.

Is the piston stuck? Remember that it is not infallible, this delicate little contrivance: that it may not be closing the air-port properly, or may even have become detached from its diaphragm. Let our amateur see that it is working freely, watch it at work, and if it prove recalcitrant, take it out and clean it. A child could do the job, and it need not trouble the novice; but should he find that it is all right, what then? I will tell him in a very few words. His trouble may be one of four or five. For instance:

(1) If the petrol is forced from the tank by pressure-feed the pressure-valve may be blocked by grit or dirt.

(2) The main petrol pipe may be blocked by grit or dirt.

(3) The float may be leaking, and have petrol inside it, thus forbidding it to rise.

(4) The needle-valve itself may be bent—thus flooding the carburettor and stopping the engine.

(5) There may be a speck of grit in the jet, and no petrol coming through.

Now, some of these are troublesome things, and they need a little practice to deal with. Commonly, on a modern engine, when the petrol fails, the pressure in the petrol tank also has failed, and it is absurd to go bothering about your carburettor until you are sure that this pressure is restored. I have seen



men in a state of terrible distress, their hands and face black with oil, portions of the carburettor all over the street, and nothing the matter after all but a little grit in the pressure-valve. So I say, having first of all ascertained that there is plenty of petrol in your tank, then take your pressure-pump and do a little hardy pumping before you think of the carburettor at all. If your pressure-gauge on the dash-board shows no result, pump though you will, you have immediately located your trouble, and the rest is easy. Look under your bonnet for the pressure-valve, take it down—which you can do in two minutes—and thoroughly clean it out ; you will be on the road again in ten minutes, glad to think you are a master of diagnosis.

It is needless to say that this paragraph does not apply to a large number of cars now on the market. These are fed by what is known as gravity feed ; that is to say, there is a petrol tank at a higher level than the carburettor—a tank fixed either under the front seat or in the dash. In this case, when no petrol is coming to the carburettor, the pipe undoubtedly is blocked or the tap is not turned on. A man does not feel pleased with himself when he has ground the handle of his motor for twenty minutes, and subsequently discovered that his petrol is turned off. But having made sure both of the petrol itself and of the tap, then deal with the pipe. It is not a bad plan if you are hung up by the roadside to force air through the length of pipe itself by the aid of your pump. If you can detect the offending length, or even pump air into the tank, you may blow out the grit and proceed upon your way rejoicing. Failing this, there is nothing for it but a length of fine wire and as careful a surgical operation as you can make. Had you been wise enough to carry a Bowden filter, all this, remember, would not have happened—the filter would have caught the grit and held it ; it would also have accounted for any water in your petrol, and thus give you a double chance. For this reason I am a staunch advocate of the Bowden filter, and know no more useful appurtenance that can be fixed to any car.

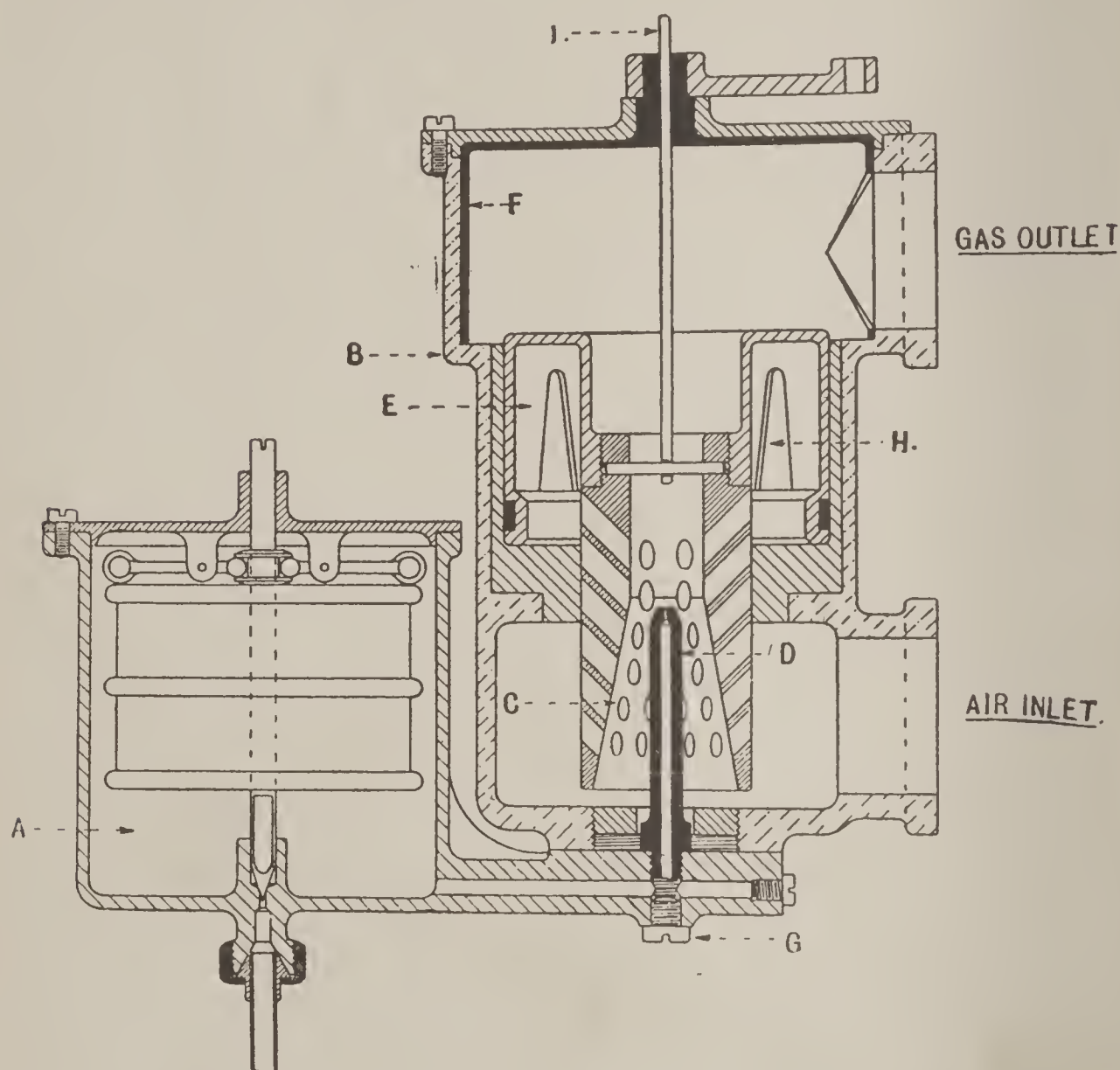
Let us pass on to other troubles that are possible. I am

not over-confident that our amateur will be able to deal with his float should anything go wrong there. It needs considerable skill to handle this float with success, and unhappy is the man who puts it into the hands of the motor butcher. This fellow will find the leak all right, and he will mend it with great blobs of solder, worthy of his leg-of-mutton hands, and as powerful in their results. Remember that it is the purpose of this float to keep a perfect level of petrol at the jet. It is so weighted by the makers that if you peer into the jet chamber when the car is at rest you will see a tear of petrol, some tenth of an inch below the top of the jet itself. Imagine what happens, then, when the weight of the float is altered by blobs of solder. Down goes the level of your petrol in the jet, the engine gets little of it out—woe and perplexity follow in your wake.

So we come to see that if we have a leak in our float chamber we need a first-rate man in our trouble. If we are not sure whether there be a leak or no, it is a good practice to put the float into hot water, and to watch it for emerging bubbles. These bubbles certainly will emerge if the float be not sound. And when we have located the place whence they come, there can be nothing easier than to drop just a single spot of solder in the offending hole. So, too, if we discover that our float is sound, but that the level of our petrol is wrong, then we must look at the delicate needle valve itself. Make sure that the spindle of it is straight, or that the cone does not need grinding in. Let us be careful, however, not to tinker with this grinding unless we are sure that it is necessary. Infinite mischief may be done by seating the valve too deeply, and we may come ultimately to require a new spindle.

The jet itself is easily cleaned. A sharp puff of wind through it will remove ordinary grit; but obstinate grit is best removed by the finest wire obtainable. Do not forget that you must not alter the bore of this jet under any circumstances whatsoever—that is, while you are an amateur and have no proper knowledge which can lead you to alter it. Afterwards, should you become a carburettor expert and

desire to improve the running of your engine, you may experiment with many cones and many jets until you find two that give you in combination the desired results. But in the early stages, at any rate, trust to your makers and their adjustments.



- A. Float Chamber.
- B. Mixing Chamber.
- C. Cone.
- D. Jet.
- E. Piston.

- F. Throttle Valve.
- G. Drain Plug.
- H. Openings in Piston.
- I. Indicator Rod.

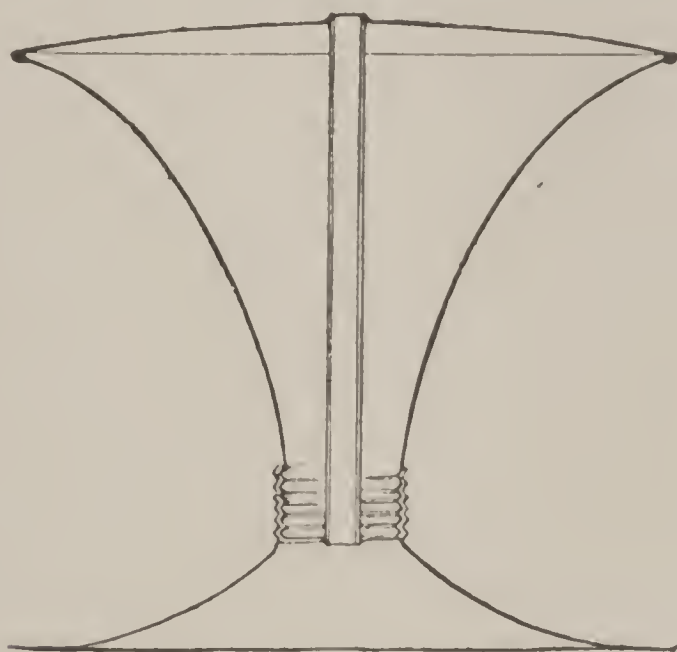
The Rover Automatic Carburettor.

Do not force a hard and thick wire through your jet, but clean it with all imaginable care, and with every regard to the existing diameter of its bore.

I say that in time you may become a carburettor expert. Possibly the makers themselves will drive you to that.



There have been some shockingly bad carburettors put on the market this last year or two. There are even famous cars—I will spare you their names—whose carburettors are so inefficient that we hear of results no better than six or seven miles to the gallon of petrol. This, of course, is altogether preposterous. I am not one of those who believe that you can run a car of great horse-power upon little petrol. I do not believe anything of the kind. The man who gets ten or eleven miles to the gallon on a 40-h.p. car is doing well enough; but a 20-h.p. car should give you at least eighteen miles to the gallon, and more properly



Gillett-Lehmann New Float.

twenty. The makers can do it; we know that they can do it because they have done it in the Tourist Trophy and other races. But they will not do it ordinarily, because they are not at the pains to adjust their carburettors or really to design them to the needs of the engine.

In this case your own experiments may well begin. My own began a year ago upon a 20-h.p. car that showed the disastrous results of seven miles to the gallon. Here there was no proper carburettor at all—merely a number of air holes which opened as the petrol supply opened. The slow running of the engine was obtained not by adjustment of the mixture, but by pouring pure petrol into the cylinder

and there half burning it. Need I say what annoyance followed this practice? Passers-by gave audible and visible signs of their disapproval. The odorous reputation of the car went far upon the stilly air. In vain I tried to deal with it. Carburettor experts came up—in cabs—and shook their heads and held their noses. “It ought to be easy enough,” they said as one man; and then they began to tinker with it. I fitted this carburettor and that, and still the results were hopeless. We put all the patent valves—but one—in the induction pipe, and tilted our nostrils as before.

Then came the day when I heard of the Gillett-Lehmann Carburettor Controller—a delightful little contrivance which controlled the supply of petrol both in the float-feed chamber and at the jet, and gave me instant peace. I can do no better than most cordially recommend the name of this firm to those in difficulties with carburettors. They are experts of singular success, and, as the times go, of much modesty.

Perhaps the golden rule to remember when dealing with all carburettors is this, that nine-tenths of them give us too much petrol and too little air. We need a considerable quantity of air at high speeds, and we need to control it ourselves. Even the common air-valve fitted to the induction pipe will often work miracles, although the carburettor itself be one of the most belauded on the market. Buy such a valve, if you have carburettor troubles, and control it from the dashboard; give the engine all the air she will take, cut the petrol supply down in the jet until you are getting but a minimum. But, as I say, your best plan is to consult carburettor experts such as Messrs. Gillett & Lehmann, and to put yourself into their hands. They will figure largely in my next chapter. I am about to ask them to speak for themselves.

## CHAPTER XV

### THE SCIENCE OF CARBURATION

THERE are few motor engineers of our time who do not realise the deficiencies of the majority of the carburettors now upon the market. Everywhere one hears of advance in this vital matter. "Give us a perfect carburettor," we say, "and we will add twenty, thirty, fifty per cent. to the efficiency of the modern engine." Among these workers the names of Messrs. Gillett & Lehmann stand prominent, as I have said. They have studied the science of carburation, and to no small profit. Their "controller" was a success from the first day of its introduction to our market. When it was announced that they were about to give us a new carburettor, interest naturally ran high. The carburettor is now before us, and invites the critical judgment. I feel that I cannot do better than to let Mr. Gillett speak for it himself, and, while speaking, to share with us some of those deeper studies of carburation upon which he has been engaged these many months.

And first he speaks of the internal combustion engine itself.

As in the case of other inventions, the internal combustion motor has been gradually perfected and made efficient by the consistent adoption of improvements. The discovery which did most for us, perhaps, was the one which taught us that the efficiency of the engine as compared with the size of the cylinder could be enormously improved by compressing the firing mixture at the moment of firing; this process also making it possible to use much less fuel for the power developed.

The extremes might be exemplified by such an early type



of engine as the Bischoff, in which the charge was slightly under atmospheric pressure at the moment of firing, and by the present Diesel, which fires while under a compression of about 800 lb.

The Bischoff required 60 to 100 feet of gas per h.p.h., while the Diesel requires infinitely less fuel, probably only one-tenth of that amount per h.p.h. The present high efficiency gas engine takes about 15 to 20 feet.

In any motor engine at present made the compression space and length of stroke remain the same, no matter what work—up to its limits—it is called upon to do. The intake of the charge determines the amount of the compression, and, this amount being varied by the throttle lever, it may be said that the efficiency of the auto-engine varies between that of the early non-compression engine and that of the late high-compression engine—this variation taking place according to the load at any time. Hence, the greater the load per stroke the greater the economy and efficiency, and one mile of crawling in traffic consumes as much fuel as three miles of “give-and-take” road travelled at a good pace.

One signal advantage the modern motor engine has over its predecessors is that of the variable time of firing, since a weak mixture fired early will give as great an output of power as a richer mixture fired later, although this can only be done while speed is kept up and the fly-wheel possesses the required momentum.

Now, before considering the actual proportions of the mixture of air and gas in our compression chamber, or the method of and reason for obtaining the same, we shall do well to study the actual movements and pressures of the air in the jet chamber under the varying requirements of the cylinders. In order more fully to grasp the subject, the atmosphere may be considered as composed of closely packed but extremely elastic spheres, which possess the power of infinite expansion, both individually and collectively.

When the engine is running, a stream of these particles is caused to flow towards the inlet valves through the car-

burettor, induction pipe and valves as the piston recedes; by, firstly, individual expansion of the particles, this expansion taking place more rapidly as the surface of piston is approached; and secondly, by pressure of the atmosphere outside the carburettor, each layer, as it were, of air being forced forward by its immediate follower, but each layer expanding as it goes towards the cylinder, so accommodating itself to the pressures existing both ahead of it and behind it. In this condition the particles cannot be considered as spheres, but rather as egg-shaped bodies of which the larger end is inward, and the sectional areas gradually increasing from choke-tube or inlet to piston-head.

It is thus seen that upon the inlet valve closing, the stream through the carburettor does not stop until the particles in the induction pipe are again squeezed up into their original size and shape by the atmosphere entering at the choke tube; and in multiple-cylinder engines this stoppage never occurs, as valves open in succession too quickly to allow of atmospheric condition being reached, and particles are always larger than they were before entering. This is merely another way of saying that pressure is lower, since, by Boyle's law, the volume of gas is in inverse ratio to the pressure.

In the multiple-cylinder engine, then, we have an induction pipe in which the air pressure, while being always at any point below atmospheric pressure, is in itself lowered and raised alternately upon each opening and closing of the valve—the mean of all the pressures being that which we can use for purposes of fuel feed.

In the single-cylinder engine, and to a lesser extent in a two-cylinder engine, and more especially one in which the firing strokes immediately follow each other, it will be seen that very unequal calls are made upon the air supply and that more time is allowed between the intake strokes for the air to enter and be compressed to atmospheric pressure, more especially at slow speeds. Furthermore, the air, having weight, and therefore momentum, does not stop flowing immediately on reaching atmospheric pressure, but is carried past this stage

to a higher pressure still near the inlet valve (which is still shut), against which it rebounds, the last-entering air being forced out again, carrying out with it part of the fuel with which it is now charged ; also blowing down the jet tube and thus causing oscillation of petrol.

These deductions prove that in order to prevent blowing back we must provide a choke tube or retarding effect between the outer atmosphere and the jet, this effect being sufficiently small to ensure that the air is always travelling past the jet in one direction only, although, of course, at constantly varying speeds. Then, again, as to the effect of throttling. By placing a throttle valve in the induction pipe we are enabled at will to establish a greater or lesser resistance in the path of the surging air particles. It might be regarded as a second choke tube with variable proportions which dams back the incoming air at will, causing opposite effects in the two portions of pipe—the pressure between the choke tube and the throttle rising nearer to atmospheric pressure whilst the other portion falls in pressure, since the engine is asking for more air than it can obtain through the throttle in a given time.

Now, as a certain output of power requires a certain expenditure of fuel, of which we are at present considering only the atmospheric part, the effect is to produce less power in the engine ; or, regarding the effect upon the fly-wheel—since speed and power are in inverse ratio—less speed.

Here we may notice that since pressure rises behind the throttle a closer aperture is necessary, since greater pressure implies greater flow. Again, time is an important factor. When the piston is travelling slowly, more time is allowed for intake, and the throttle must be closed to such a point that the amount of fuel is exactly proportioned to the required power. It is important to bear this time factor in mind, as evenness of running is greatly due to a right understanding of it. The engine takes more air stroke for stroke while gradually falling in speed at any given position of the throttle, and less air stroke for stroke while gaining under the same conditions.





The 40-h.p. Weigel Chassis.



The damming action exerted by the throttle can only take place while the effective opening of the throttle is less than the effective area of the inlet. When the throttle area is equal to, or greater than, the inlet, further opening movement of the throttle lever produces no effect on the volume supplied to the engine, while if the choke tube be not large enough to provide sufficient air to the engine (viz. capacity  $\times$  time  $\times$  pressure of atmosphere up to the limits provided by the clearance of exhaust, the engine cannot exert its full power.

The proportion of fuel to air supply needs careful consideration if we are to obtain efficiency.

In any engine producing constant power with constant revolutions a certain weight of air—or volume at atmospheric pressure—will be consumed in a given time, and it is an easy matter to supply the correct quantity of liquid fuel—the only alteration required being that necessitated by changes in the atmospheric conditions, great economy being reached in consumption.

But in propelling a vehicle on the road many difficulties present themselves. The amount of power required is constantly changing, the engine speed constantly falling and rising; and the fuel supply becomes a very difficult problem. Under these changing conditions we have to supply differing proportions of fuel.

First, as the consumption of air per stroke decreases, that of petrol must be increased, since less air means less compression and lower compression requires more fuel. Unfortunately, this necessity brings us at once to a further difficulty. The engine may be running slowly or quickly while doing very little work and having low compression. A rich mixture expands or explodes very much more quickly, but also dies away more quickly, than a poorer mixture. Thus a rich mixture is necessary while the engine runs fast at a low compression, but at low speeds with the same mixture the explosion is too rapid, delivering a blow to the sluggish piston and either dying away before doing effective work producing heat without energy, or accelerating the engine too much. Fortunately, by still further enriching the mixture, the



rapidity of expansion again is checked and the engine can be made to run slowly at low compression, but at great sacrifice of economy in fuel and consequent incomplete combustion.

Thus the carburettor must supply a differing mixture at the same compression, more petrol at low speed and less at high, and this independently of the power developed.

When the engine runs slowly at a low compression, the air also passes the jet slowly and there is little variation of the pressure in the jet chamber, with a consequent small discharge of petrol ; but running fast at the same low compression more charges are taken in during a given time, and greater reduction of pressure occurs in the jet-chamber, the quantity of petrol being thus increased.

The carburettor must provide for this contradiction, and often does provide for it, but incorrectly, by so proportioning the size of jet to choke that ample petrol is supplied at low speed, while at high speed *too much* is provided ; and herein lies the secret of the wasteful as against the economical carburettor. It is often the case that a motor runs for miles at high speed while using low compression, wasting fuel all the time.

Incidentally the argument proves the economy of using the highest possible gearing, whereby we obtain the highest compression with the lowest consumption.

This law is apparent throughout the whole range of engine-speeds and loads, viz. less compression, more petrol.

By compression is meant the volume of air at atmospheric pressure actually taken into the cylinder and compressed at each stroke. A charge which is too weak to fire at low compression may fire if more highly compressed.

A very great deal of economy is obtained by correctly timing the firing point. The power developed in the engines is due to the expansion of the contents of the cylinder, which consists partly of combustible matter and partly of incombustible. The latter, being expanded by heat caused during the chemical combination of the former, helps very considerably in the development of energy.

A weak mixture contains more inactive material than a rich

one, and requires more time to reach a maximum expansion ; the time of firing therefore should be advanced. The maximum is reached at a point when the piston receives a push in the direction of working, as opposed to a sudden blow at a moment when, owing to overload, it is unable to respond quickly enough.

A rich mixture explodes more rapidly, and a shorter time is required for combustion. The point of firing therefore should be later.

At times of heavy load, as in hill-climbing on high gear, full compression and rich mixture are usually given ; and since the piston gradually accelerates from the dead centre, the firing point must be retarded until the piston is travelling fast enough to receive the explosion without shock—or our familiar friend the engine-knock appears.

In the Gillett-Lehmann system of controlling the fuel-feed, connections are made with the float-chamber in three directions : firstly with the external air, secondly with the induction pipe above the throttle, and thirdly with the jet chamber. Thus, while the air is passing into the float chamber from the atmosphere, it is being constantly removed into two parts of the induction pipe, pressures in these two parts varying in opposite directions. When the throttle opens, the variation of the pressures is slight ; when the throttle is closed it is considerable.

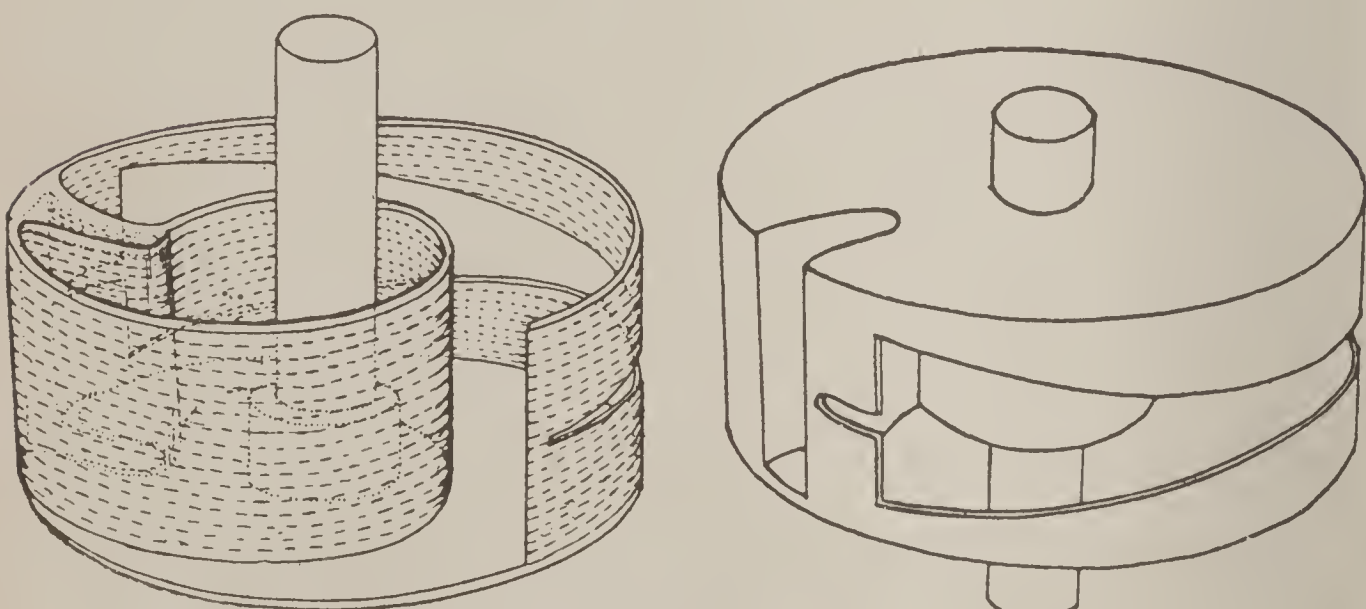
An internal combustion engine, so far as its intake stroke is concerned, is nothing more or less than an air-pump, with the difference that while an air-pump removes air from a pressure which decreases steadily as the pump works, the engine draws from a constant atmospheric pressure ; and were no variation in throttling to take place, each intake stroke would measure the same weight of air. This being combined with a proportionate weight of fuel would give a constant power output, subject only to the engine speed being maintained at a constant value, and, since speed will be governed by load, at a constant load.

Now, in driving a motor-car, these fixed conditions are impossible ; variations in engine speed take place constantly,

either owing to change of road gradient or movements of the throttle lever. Load varies in relation to road, incline, surface and wind pressures. Weight of air and fuel varies with all these differences.

These changing conditions, whether voluntary or involuntary, must so affect the fuel supply that its measure must be absolutely automatic. Not only must the fuel be changed in proportion to the air, but differing proportions must be made to suit changing conditions in speed, if due regard is to be paid both to efficiency and economy.

Generally it may be taken that a richer mixture is required



Gillett-Lehmann Throttle.

when the engine begins to accelerate than when such acceleration has taken place, and *vice versa*. These changes of speed, it must be understood, may begin from any given number of revolutions to any other number.

In the usual jet carburettor the atmosphere presses on the surface of the petrol in the float chamber and ejects liquid fuel from the jet exactly in proportion to the area of the jet orifice and the difference of pressures between the float chamber and the jet chamber—the term “suction of jet” being the usual way of expressing this.

It is evident that were no atmosphere allowed to enter the float chamber, and the spaces above the petrol and jet



chambers were connected, then the pressures would coincide, in which case no petrol would be injected at all; therefore, some excess of pressure *must* be allowed in the float chamber.

With the throttle at any position, should the engine accelerate, more charges are taken in a given time and the pressure in the jet chamber falls in proportion, while the pressure in the float chamber remains as before, the greater difference between the pressures giving more petrol, whereas less is required.

In order to overcome this obvious defect the Gillett-Lehmann Controller was invented. This communicates the rising pressure below the throttle combined with falling pressure above the throttle in such proportions that the desired effect is obtained in the float chamber.

While the greatest possible drop in pressure in the jet chamber is, in a well-made carburettor, no more than is necessary to allow of sufficient fuel-feed, for which purpose some depression must occur, the pressures above the throttle will vary from those below the throttle to some few pounds only above zero—in approximate figures, below the throttle from 14·7 to 14·3 lb. per square inch, and above the throttle from 14·3 to 9 lb. absolute per square inch.

Neither of these could be used successfully by itself, but when combined in proper proportions they give the required influence in a manner which has been attained by no other method, and withal so simply that it seems difficult to imagine anything better.

## CHAPTER XVI

### GOING AFT TO THE PROPELLER

WE have done a good deal for our engine when we have made sure of ignition and carburation. These, with rare exceptions, will be responsible for a running car, and one running with some satisfaction. And while it is so running we may well, as it were, take a general walk round and see what remains to be done.

We have already filled our radiator and completed our lubrication. Any radiator troubles that may pester us will not possibly be immediately apparent. Should the engine begin to over-heat, we shall discover the fact later on when we have driven twenty or thirty miles or so, and our passengers begin to sniff the morning air. The odour of burnt oil is a warning, consequently, of no unimportant character. Should we detect it, we shall know that our pump is not running, that our radiator is leaking, or that our fan has ceased to revolve. The fan being the usual readiest delinquent, it is sufficient to point out that the belt of the fan is probably at fault and that it is slipping. On many cars there is an eccentric now fitted by which this belt can be tightened in an instant. Failing some mechanical means of adjustment, the belt itself must be shortened just as the belt upon a motor-cycle is shortened—by cutting a length from it and riveting it again. This is not a difficult affair; but I will say at once that if our novice have a leak in his radiator or if the spindle of his pump be broken, he must hie him immediately to the shops and there get relief.

The repairing of a radiator is a most tricky and intricate business. Indeed, it is said that when once a radiator has begun to leak it will always leak and that there is no lasting

cure for the misfortune but the obvious one of buying a substitute. I do not myself quite share this extreme view. A clever mechanic will often make a good job even of a wicked radiator; while the novice himself, should he be provided, as he ought to be, by the makers with a temporary repairing outfit, can often stop even a bad leak on the roadside.

There are other troubles in the water system; but these are often of our own contriving. Remember that it is vitally necessary to see that you have not an air-lock in your pipes. This is often detected with difficulty; but you can surely detect it if, having first drained every drop of water from the cylinders, you fill your tank again with the draw-off cock open. There is always a little tap at the bottom of the water cistern by which the tank can be emptied. If we fill up with this tap open and do not close it until the water begins to run from it, we shall know that an air-lock is not the trouble and that we must look elsewhere.

Happily for our comfort these are rare occurrences. The average driver upon a good modern car rarely knows anything of serious troubles. He may have to pack a joint occasionally with an asbestos washer, to attend to a leaking union here or an obstinate tap there; but the business is almost always to be done at home, when there is leisure and inclination. In an ordinary way, when he has filled his tank and seen that his belt and pump are running, he may quit his engine and begin to think about his transmission.

Clutches are of many orders nowadays, and their ailments are not a few. For my part, I shall not hesitate to say that despite all that has been done, and is being done, in the exploitation of metal-to-metal clutches I remain an out-and-out advocate of the old leather-faced variety. Possibly, if the truth could be known, nine-tenths of the manufacturers join with me in this confidence. It is true that a man must be a skilful driver to get the best out of a leather-faced clutch; but should he become the master of it, he will never be really happy with any other.

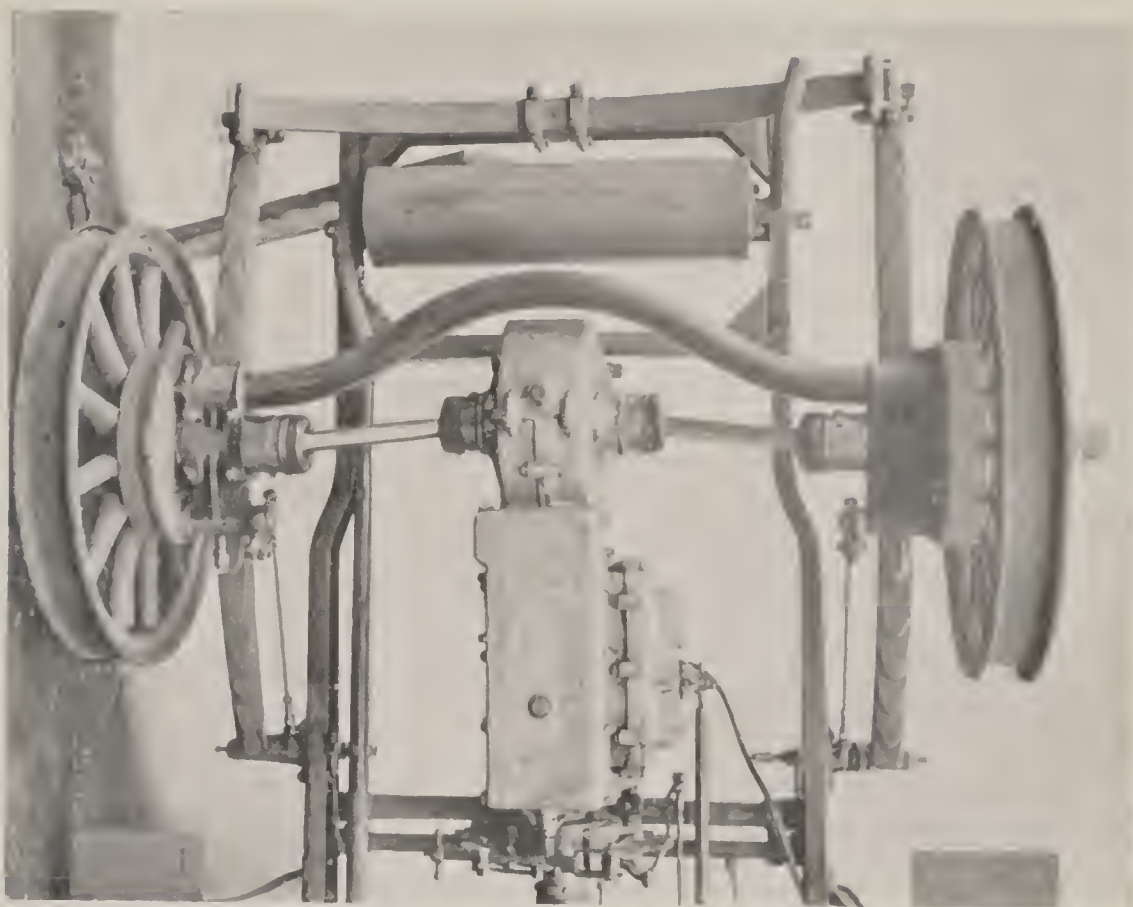


How simple a thing that old leather cone clutch was! How delightfully responsive to a clever foot—how reliable! Now and then, be sure, we had to give it a little fatherly attention. We washed it occasionally with paraffin and then applied a dressing of castor oil. Sometimes, if we were a bit cracked, we listened to other madmen and tried all sorts of remedies to prevent it slipping—even applying resin as a last desperate remedy. I remember a man in my own neighbourhood who treated a leather-faced clutch with resin according to the directions, and was engaged with a heavy chisel for three days afterwards trying to separate the concave from the convex.

All, in this case, that was wanted was a new leather, and a properly fitted leather. Here I admit some shameful jobs were perpetrated by maladroit workmen. Clutch out of alignment, leathers at the wrong angle, ill-fitted rivets—all these annoyed us. But I say again, that given a sufficient breadth of leather and a good workman this ancient clutch has had no rival.

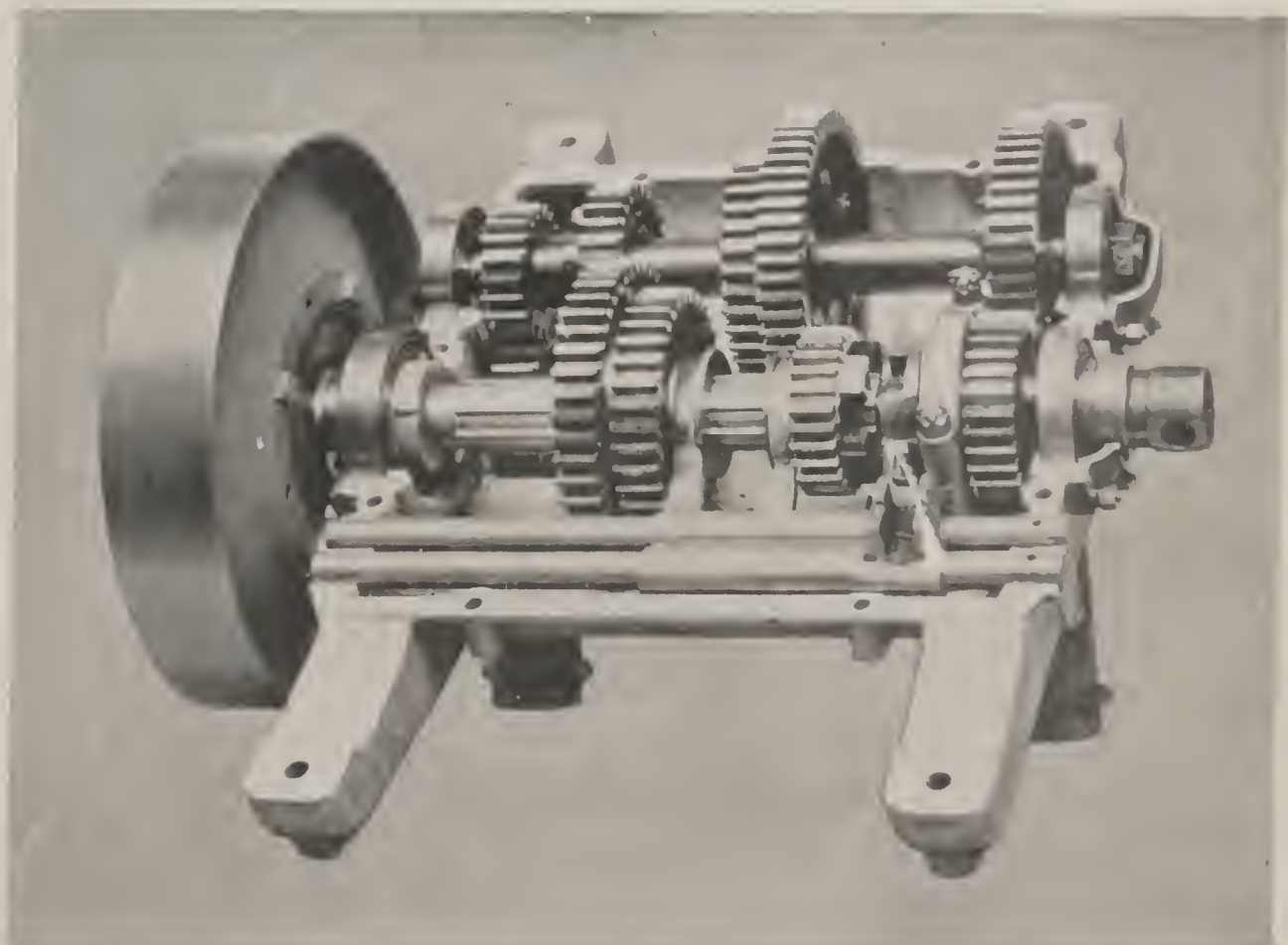
Should our novice be the possessor of a car fitted in this old-fashioned manner, I cordially recommend him to give his clutch a little kindly and wise attention. Let him wash it with paraffin whenever there is grease upon it, treating it afterwards with a little castor oil placed upon the broad blade of an ancient knife and so well worked into the leather. He will be careful to oil or grease the shafts about it every day, and directly his clutch begins to slip with him he will ask himself in what condition the leather is and whether a new one be not necessary. Carefully looked to in this way a driver almost forgets that he has a clutch when he is upon the road.

It is otherwise, I fear, with some of the metal-to-metal varieties. I shall never forget the astonishment of an old motoring friend of mine when first he drove a 40-h.p. Mercédès through the city of London and emerged therefrom with a white-hot clutch. He had driven a Panhard until that date; he did not understand with what care the oil-feed to a Mercédès clutch must be regulated; and this was the



*Photo by Campbell-Gray.*

The De Dion Rear Axle.



Gear-box of a Six-cylinder Rolls-Royce.





penalty. Forty drops a minute they had told him at Cannstadt. I do not suppose he had leisure to count them when he was negotiating the traffic by the Bank.

The latest practice in the matter of our clutch is that of the Hele-Shaw in its many phases. The principle is not really complicated. You have your engine-shaft carrying a number of thin steel plates which, by the aid of a spring, or springs, are pressed upon a similar number of thin steel plates carried by the driven shaft. When these plates are drawn together and the oil is squeezed from between them, they give a powerful drive, but one of a kindly nature. It is obvious that the pairs of plates will not hold until the oil is squeezed from between them. You cannot have any sudden shocks or jars with the Hele-Shaw clutch. What you may have, however, is a superfluity of oil which will not be squeezed out, and will cause your clutch to slip most violently. On the other hand, you may not have oil enough, and the whole may overheat with the most disastrous results.

The first clutch of this kind which came to my notice, so far as driving went, was on a powerful 40-h.p. car entrusted to me last year. I set out gaily with it upon the Oxford road, and coming to Dashwood Hill I hoped to take it at least on my third. When the time came, however, to change down—although I but just touched the pedal with my foot—the clutch absolutely refused to take up the drive again ; and there I was reduced to a humiliating ascent upon a slow first. When I spoke to the makers about it, they said, “ This clutch must be washed out with paraffin every hundred and fifty or two hundred miles at least ; it must then be charged again with the oil we sent to you, and charged in the exact measure of our directions.”

Messrs. Hele-Shaw's own directions for the erection and upkeep of their clutches are as follows :

“ Each clutch must be erected in accordance with the working drawing sent out with it. The following are important points to remember in connection with the Hele-Shaw clutches.

“ All the discs in a Hele-Shaw clutch have driving notches

either on their inner or their outer edges. A pack of discs in a clutch must begin with an 'outer' and end with an 'outer' disc. The intermediate discs must be 'inner' and 'outer' alternately throughout the pack.

"Take care when the clutch is erected that the discs are properly supported at the back by the fly-wheel. When the clutch is in gear, the coil springs in the cover exert considerable pressure on the discs, and these must be held up against that pressure by the fly-wheel or some of its attachments.

"Another important point is the clearance necessary for the plates to free when the clutch is out. The sliding sleeve which draws the clutch out of gear must have at least  $\frac{3}{8}$  in. movement before it is stopped by the clutch brake. The withdrawing movement of the sliding sleeve takes the pressure off the plates, and this movement must not be checked by the brake until the sleeve has been withdrawn far enough to give the discs sufficient freedom inside the clutch.

"The simplest and best way to ensure the clutch brake being in its right position is to loosen the nuts on the inner member of the brake and, withdrawing the clutch by the pedal, let the outer member push the inner member back along the shaft as far as it will go; then, letting the clutch in again, tap the inner member forward a little (about  $\frac{1}{8}$  in.), and fasten as before. This will ensure that the back brake is working properly, and at the same time ensures the maximum clearance for the disc when the clutch is out.

"The amount of oil required for a Hele-Shaw clutch is approximately one pint, but in all cases the right quantity is marked on the outside of the case. No special lubricant is necessary; any thin mineral lubricating oil that will stand a high pressure will give perfect satisfaction.

"Perfect alignment is necessary for the proper working of the clutch. The alignment of a clutch can be tested by taking out the pressure springs and working the sliding sleeve to and fro by means of the clutch pedal. It should move easily, with just so much resistance as might be



Details of the Daimler Carburettor.



The Daimler Gear-box and Differential





expected from the suction of the oil in the box and the resistance of the small springs between the plates. If the movement is very stiff or jerky, the alignment is most likely at fault, and the cause should first be looked for in the arrangement of pedal levers. These levers may be badly arranged, tending to lift the sliding sleeve instead of drawing it straight back.

"These pedal levers should be arranged to give a purchase of not less than 6 to 1, so that the movement of the pedal is easy to the foot, and delicate manipulation of the clutch becomes possible in traffic.

"As the plates wear, the spring pressure becomes lighter, and must be increased by screwing in the spring caps, taking care that all the caps are equally adjusted and afterwards locked by means of the nuts. The brake disc can be set up afterwards to correspond.

"The joint between the flange of the clutch and the fly-wheel must be jointed with a paper face to prevent leakage of oil. The corresponding joint between the cover and the case is similarly packed before leaving the works. These paper faces must be replaced unbroken after a clutch has been dismantled, or the clutch will lose its lubricant.

"The clutch may be washed out occasionally with paraffin to remove any sediment due to wear of the plates.

"If these instructions are followed, the motorist will have a clutch that will last as long as his car without renewal of the plates."

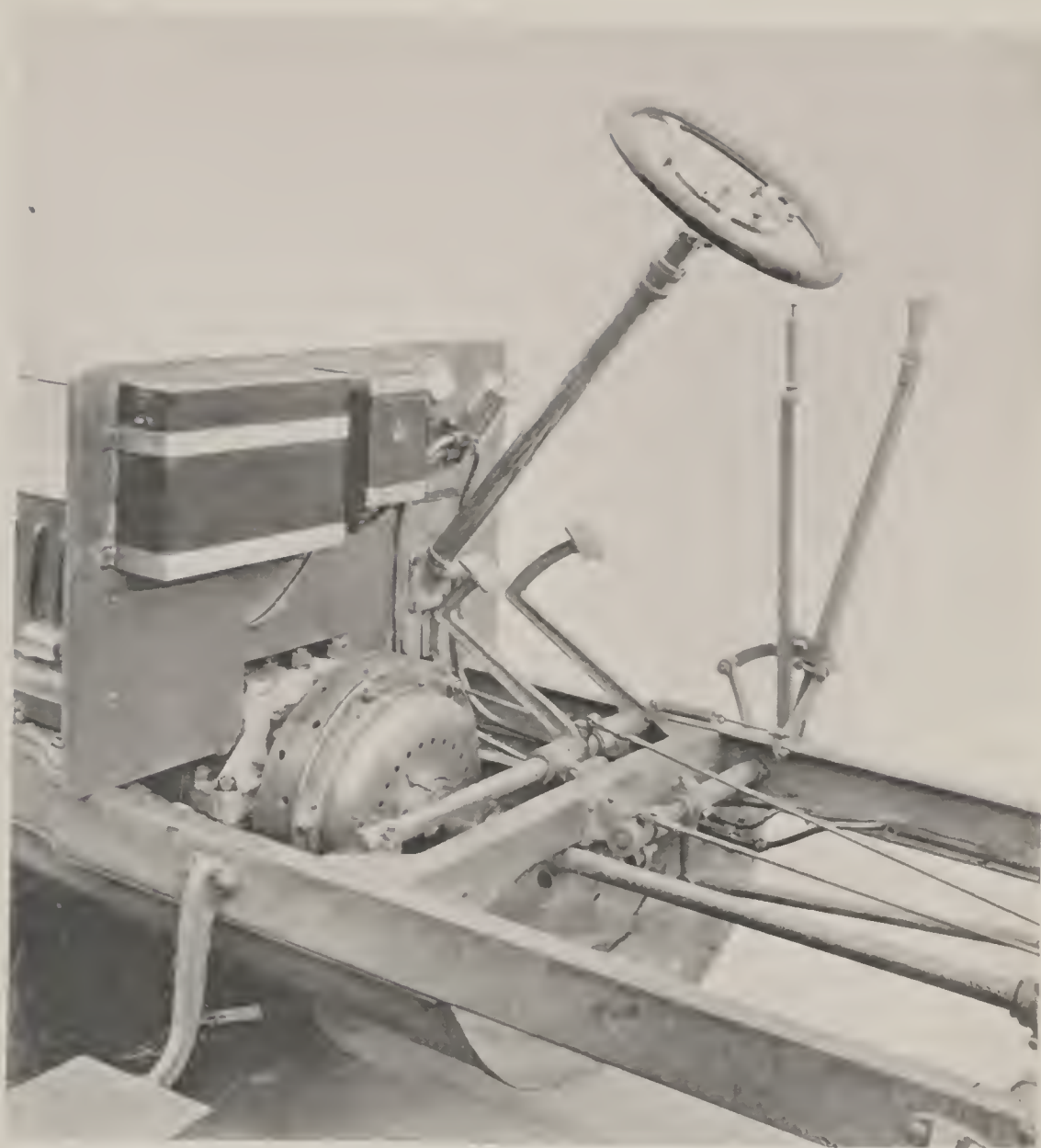
I have since discovered by experience that it is this frequent washing out of the Hele-Shaw type of clutch which ensures perfection in running. The oil, if left in the case, seems to lose its properties after a certain number of miles have been run; and while refusing to lubricate the clutch properly, merely causes it to slip. The greatest care is necessary in following the makers' instructions where these clutches are employed. Both the kind of oil and the amount of it are matters of quite vital importance; and no man should drive upon such a clutch until he has not only mastered its principle, but given the maker a patient car.

Mr. Edge's directions in the manipulation of the 6-cylinder Napier car are to wash out the clutch every thousand miles with paraffin, and to refill with a pint of Napier Clutch Oil. Each maker appears to have his own views on this point, and rightly to have them. The Hele-Shaw clutch itself, though largely used, has been followed by many metal clutches of a simpler kind, each demanding its special treatment. The Napier Clutch, of course, is one of the simplest and the best of these, while much praise has been bestowed upon the Rover design.

The latter, I think, is one of the simplest of all metal-to-metal clutches, and quite one of the best. In principle it works almost as our brakes work. A pair of shoes is expanded or contracted at will. When expanded, they grip the driving drum; when contracted, they let it go. Other clutches have but a single loose plate gripped between two others when the clutch pedal is released. The new Mors Clutch, too, depends upon a simple toggle arrangement which draws a steel band tight upon a drum. Next year will bring still another type of this metal-to-metal device, I make sure. We shall hear less and less of our old friend Master Leather-Face, but shall not cease, for all that, to regret him.

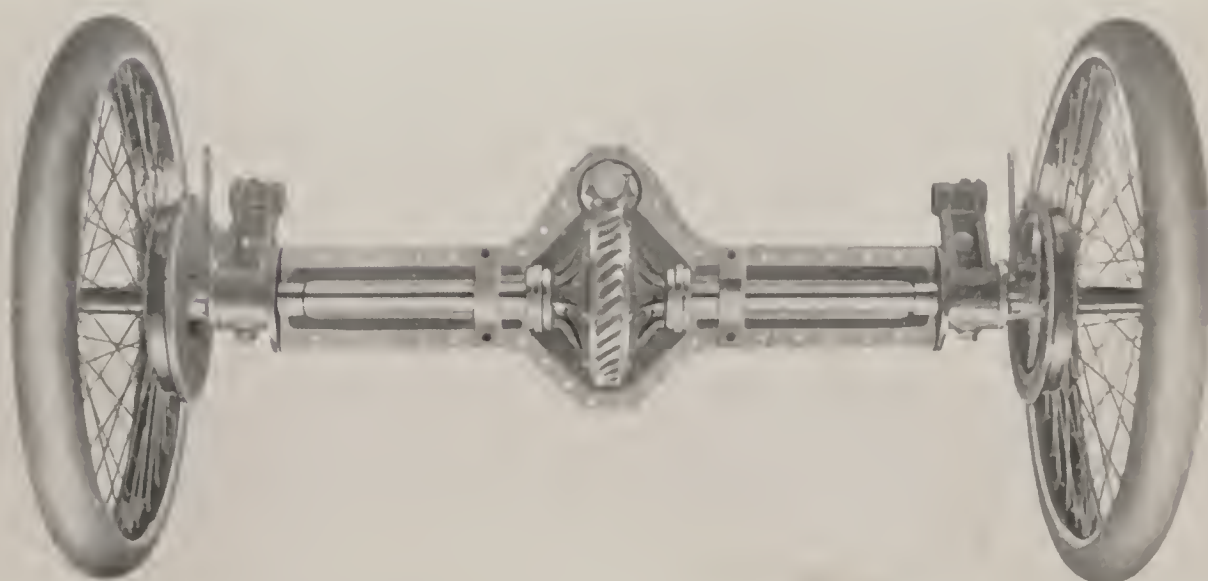
The clutch being properly oiled, and, if necessary, adjusted, the amateur who is setting out upon his car must next give an eye to his brakes. I take it that the lubrication of the gear-box is already completed. Should there be a serious defect in his gear-box, that will also be a job for the shops. Modern gears can give very much or very little trouble, as the case may be. There are some notoriously cheap cars whose gear wheels will run nine months at the best. There are other gears which will run three years, and show but little trace of wear at the end of it. All that we can do is to examine our gear wheels periodically to make sure that they are bolted firmly upon their shafts, and to leave the rest to Providence and good grease.





*Photo by Campbell-Gray.*

Showing the De Dion Dash and Clutch.



Lanchester Rear Axle showing Worm Drive.



The brakes, however, are another matter. They must be our daily care. I would name that man as little less than a lunatic who does not try his brakes before he tries anything else when his car is upon the road. For just think what may happen even to good brakes! You may find a poor adjustment upon your counter-shaft brake and no hold there; there may be too much oil upon your rear expanding brakes, and they may refuse to act; you come to even a moderate hill and find the car beyond your control. The papers record another motor accident.

Now all this could have been prevented had you tried the foot brake directly you emerged from the stable. It would have told its own tale; you would have descended immediately from your perch, and, taking the spanner in your hand, would have given a few turns to the nuts which govern the adjusting rod. Having unscrewed your lock nuts to begin with, you would have drawn the brake up, testing it as you did so by depressing the pedal, and being sure that it did hold before you drove another mile. Brakes adjusted too closely to the drums are, of course, a danger; but what we must do when adjusting our foot-brake is to see that it will stop the car dead, say, at a speed of fifteen miles an hour, and stop it without too violent an effort. This we can tell, not by jamming on the brake with cowardly force, but by applying it gradually as a locomotive driver applies his brake. Just touch the drum with it at first, and then bring the pressure to a crescendo. What the car does in the last three or four yards is an index to true adjustment. If it goes rolling on, coming to a stop very gradually, our brake is out of adjustment. If, on the other hand, having applied the brake gradually at first we press it right home in the end, if then the car pulls up dead, we may proceed in safety.

There is a good deal of trouble with the internal expanding brakes upon our rear wheels, and much of it is caused by later design, as it affects the back axle. We now oil our rear wheels—when we have a propeller shaft—through the differential, the oil flowing along the outer



casing, and so into the rear-wheel axle-box. It also, alas, flows in no small quantities into our brake drums; and while it is there, effective rear-wheel braking is impossible. The moral is that we must oil our differential with care, keeping the lubricant as low as we can do with safety, and washing out the brake drums themselves with paraffin whenever we have inefficient braking.

## CHAPTER XVII

### A GOSSIP ABOUT TYRES

I HAVE often wondered how many amateur motorists would be plagued by that terror, the professional chauffeur, if it were not for tyre troubles. Admittedly, so far as the motor-car is a substitute for the brougham, the paid driver is necessary. We cannot drive ourselves to the theatre or the restaurants ; nor do we, in the country, arrive at our friends' houses with a flourish and ask the way to the stables before we go into the drawing-room. My remarks apply entirely to the tourist.

What a joy to be alone upon the road ! How delightful to be quit of that grinning and greasy lout who costs us so much money annually ! Let us enter a town with him and we know that he will cost us some ten or twelve shillings a day wherever we may house him. And what return will he make to us ? Why, just this—to command the ostler to clean his car and to charge us for doing it while he is abroad with the local "Mary Ann" and the cheapest brand of cigarette.

No, we must be quit of this fellow if we are to enjoy our touring ; and we shall be quit of him finally when tyre troubles are made easy for us. This, of course, is already upon the horizon—the great races of the year having all been won upon detachable rims. That the detachable rim is to be a feature of the motor-car of the future I have no more doubt than of my own existence. All this wrestling with heavy and obstinate covers, this knee drill in the dust of the road, these muttered phrases, these wicked delays—all must go into the *Ewigkeit*. We shall have our cars fitted with the latest

form of detachable rim and all the heavy work will be done in the stable for us.

This, I say, is for the near future—possibly for the year 1908. The old tyre will, of course, predominate enormously for many years to come ; but that it is doomed, we can have no doubt whatever. A detachable rim when properly kept cannot give the user much trouble. Should it be improperly kept, the bolts and nuts left to rust and jam, then the last state of the motorist will be worst than the first. Happily, as a counter to this gloomy prophecy the Dunlop Company appears to have invented a detachable rim which even the careless may be able to handle with success. But one turn of a locking-key is necessary to free the binding-rod which holds this rim in place.

The very simplicity of the affair is a guarantee of its success. And if we have not seen much of it upon the road hitherto, let the maker's interest answer for that. Here he is with an unsold stock of the ancient tyres ; these he must dispose of before he begins to whisper these magic words, "detachable rims," into the ears of a prospective customer. Those of us who would drive upon detachable rims immediately, must carry our wheels to Messrs. Smith Palfrey, or other cunning wheelwrights, and there have them adapted to the new invention. The detachable rim is at present for the few. The agent's balance-sheet forbids it to be otherwise.

These being the facts, I am driven back to a consideration of the older fashion and of the troubles it presents to the amateur who would drive his own car. Happily, these are not what they were even a couple of years ago. The Stepney Spare Wheel has altered all that—in a measure, perhaps, itself a substitute even for the detachable rim—for it is a detachable rim, though not a permanent one. A clever operator can fix a Stepney Spare Wheel in a quarter of an hour at a liberal estimate. He has but to jack up the offending wheel, to deflate the old cover, to insert the clamps of the Stepney and to screw them home. Every amateur who drives his own car must find these wheels indispensable.



I see them everywhere—I hear nothing but praise for them. They may even yet prove a stout antagonist to the coming fashion.

But let us suppose that our amateur has not a Stepney with him, that he carries the ordinary spare cover and two or three spare inner tubes. He will meet with punctures on the road, of course; but if he cares for his tyres properly, he will meet with less than others who are more careless. In the first place, when his car is at home he will often test the pressure in these tyres—doing this not by the gauge upon his pump, but by a special gauge such as that Messrs. Sutton or Messrs. Michelin supply. Should any tyre show a pressure less than seventy-five pounds he will know that it must be blown up. Should any tyre vary in its pressure from day to day he will understand that the valve is probably leaking and must be seen to.

Every manufacturer of tyres who has ever written upon this subject insists, first and foremost, on the maintenance of pressure in our tubes. I myself had a good lesson in the matter when first I bought one of Messrs. Sutton's gauges. I had always thought that my driver was keeping his tyres fairly well blown up. We used to argue the point, and he was emphatic in his assurances that the tyre gauge upon his pump showed at least seventy-five pounds of pressure. When, however, we put the Sutton gauge upon the valve, then we discovered that we had in no single instance a pressure of more than sixty-five pounds, and one tyre did not show more than fifty. Since when, as the advertisement goes, I have used no other. It is almost my daily care now to try my tyres upon the Sutton gauge and to make sure that the pressure is there—for I remember that no deflated tyre will long resist puncture and that he who shirks a minimum of labour in the stable is likely to meet with a maximum of trouble upon the road.

I should advise every tyro to follow very carefully the instructions given by the makers of the tyres he employs upon his car. Whether they be Dunlop, Michelin, Continental, or Palmers, he will be supplied with a little book

which will show him the necessary pressure for the particular kind of tyre and will emphasise the need of maintaining it. This would apply also if we had detachable rims. For remember, that a tyre has just as much to be put upon a rim when that rim is detachable as when it is fixed. I have not tried the thing myself, but I can imagine that the fixing of a heavy cover upon a loose rim laid flat upon a table will be no child's play, and that we shall need some weeks of practice to become experts at the business.

Having been careful to blow the tyres up properly, our amateur should next examine their condition casually every morning, but very carefully at least once a week. Big cuts must be filled up immediately by such a preparation as the Pneu-cure or some other form of good solution. This is most important. A small cut left in a cover quickly becomes a big cut; water gets in and rots the rubber; perhaps flints take refuge there and breed a family. We get thereby vulnerable places in our tyres which any undue pressure may burst or even a comparatively blunt obstacle may puncture. For this reason it is imperative that we should clean and fill every considerable cut that appears, and directly it appears, and should take no risks under this head.

As to our non-skids, it will be necessary to watch the state of the bands or the studs most carefully, removing loose or torn pieces at once, and allowing no broken studs to remain. I am perfectly aware, when writing this, that the older type of flat band is rapidly disappearing. The non-skids, as made by the great tyre firms, give little trouble until they are worn out; and when they are worn out, then "good-bye" to them. It is, within my experience, hopeless to expect this pattern of non-skid to be retreaded. Once it goes it is useless, and should be thrown aside without hesitation.

Dwelling for a moment still upon the care of the tyre in the motor-house—before passing to its care upon the road—I would remind you that rubber perishes by light, grease, and damp. Light in consequence should be kept from your inner tubes; damp and grease both from tubes and cover. There

is an excellent canvas case made by Gamage for our spare covers. These when not upon the car should be kept either upon a shelf, or, if a shelf be not available, then they should be hung upon big nails hammered into the wall. Spare tubes should always be kept in indiarubber bags such as the makers supply. A little French chalk may advisably be rubbed over them before they are put away; but the valves should be carried complete and not in fragments, as some chauffeurs will carry them. These fellows are shockingly wasteful everywhere; but nowhere is their waste more remarkable than when dealing with our tyres. Keep a watchful eye upon them, and make them account for everything. By this means alone shall we keep our bills down.

The great secret of running a car cheaply, so far as its tyres are concerned, is a very simple one. Not only should we have our covers of a proper size for the weight they are to carry, but we should insist upon a margin over. I tried the experiment last year of running a 30-h.p. car weighing some twenty-six hundredweights upon 870 by 90's, with the result that I spent £140 upon tyres in little less than three months. This was a preposterous outlay for so small a car, and I began to perceive that the condition of things was far from a happy one. A change to the 880 by 120 size did much to stem the tide of disaster. I should have done better, perhaps, to have put on tyres as large as a 135; but the moral was obvious, and it is a moral for every car-owner—carry upon your rear wheels the biggest tyre your wheel will take. I say rear wheels because I am not an advocate of large tyres upon front wheels. Mercédès' practice has always been to put 90's upon their front wheels, and not to be tempted to graver risks even by the compensation of greater luxury in travel. There can be no question whatever that a burst upon a front wheel is a dangerous thing if you are driving at a high rate of speed, or taking a curve when the catastrophe happens. But the danger with a tyre, say of 120, is proportionally greater than with a tyre of 90. You decrease a greater diameter and put a correspondingly enhanced strain upon your steering-gear. This is a point I have not seen



emphasised in many of the manuals I have read ; but I feel sure it is a point for the amateur to notice. Let us keep down the size of tyres upon our front wheels, and so keep down the risks attending a burst there.

Of course, tyres will burst and they will puncture ; and this they will go on doing to the end of time. I myself would not give a fig for any of those special preparations which seek to minimise these happenings. In my experience they are messy or inefficient and non-resilient. What an amateur chauffeur has to do is to learn to master tyre-changing and, by practice, to make light of it. Nowadays it is not the task that once it was. We have learned that small and inefficient levers are no good to us. There are patent contrivances—notably a rolling machine sold by Messrs. Smith, of the Strand—which are of enormous assistance to the amateur. But supposing that he has the best implements possible, then system and knack are his best friends. He should, to begin with, make a kind of chart, which will serve him to pass the motorist's "little go." Thus, to change a tube :

(1) Draw the car well to the side of the road and bring her to rest on the level. If the road is sloping, she may run away from your jack or back on you.

(2) Get out all your implements—the jack, the spare tube, three small levers, and a big fork lever to pass the new valve in.

(3) Jack up the car, getting the wheel just clear of the ground.

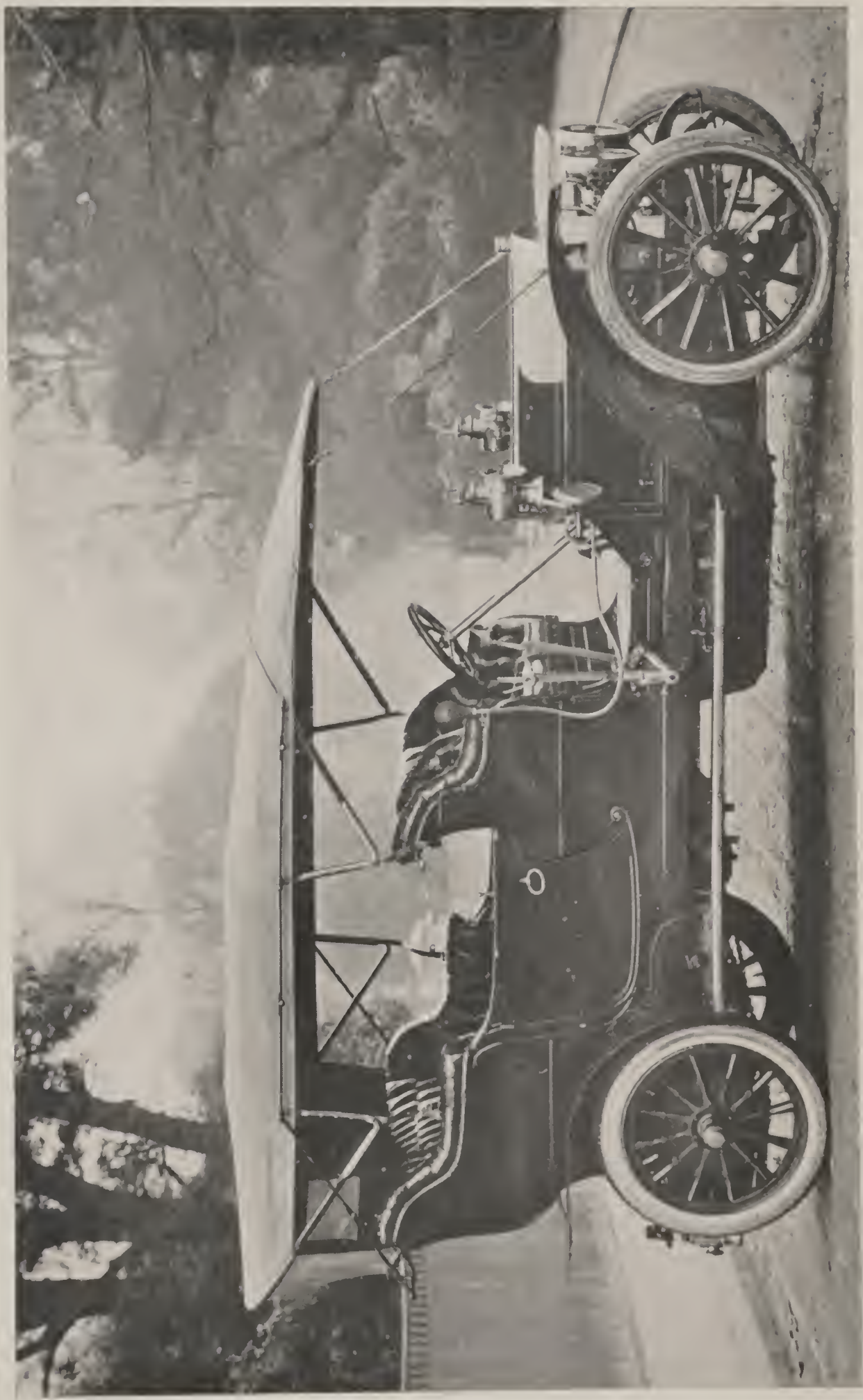
(4) Brush all the dirt and dust from the spokes.

(5) Unscrew the valve cap and remove the barrel of the valve, also the big nut and washer.

(6) Unscrew the wing nuts of the security bolts and bring them to the bottom of the thread.

(7) Insert one of your small levers between the cover and the rim on the opposite side to the valve and midway between the security bolts. Insert a second lever some ten inches from this, and depress them both sharply downwards.

(8) If you have one of the patent rolling-off levers (*a*) you will now insert this between the cover and the rim and simply



The 30 40-h.p. Fiat.





screw the outer edge of your cover completely off. But if you have not such an implement, you will act as follows :  
(b) Having started the cover by the downward pressure of the levers, insert the third lever, if you are clever enough to do so, some ten inches from the second, holding the first lever down with your knee, and depress both sharply downwards with the hands. This will bring the cover off as easily as a glove comes from the hand. The rest of it can now be merely pulled out ; and having removed the old tube, and having cleaned the cover of all dirt and grit, take your can of French chalk, sprinkle a moderate amount in the cover and revolve the wheel sharply. Do not use too much French chalk, and see that it is absolutely dry and free from lumps. Now, before putting the old tube away, ascertain where it is punctured and mark the spot with a blue pencil. Take a new tube, fold it carefully to squeeze all the air out of it, and inserting your big fork lever one prong on either side of the valve hole, lift the cover and insert the new valve.

See that the overlap in the join of the tube is on the rearward side of the car. Now fold the tube neatly round the rim, being sure that it is not twisted anywhere and that the overplus of it is lying in neat flat lengths. All being well in this respect, you may refit the barrel of your valve and inflate the tyre slightly—ten or twenty strokes of the pump are quite sufficient. We must then have another look to see that the slightly inflated tyre is lying evenly in the rim ; raise it on the security bolts, which, of course, are still unscrewed, feel it with your hand under the cover, and be quite sure it is not twisted. Then take two of your short levers, insert them between the outer cover and the rim, dipping them under the tube and raising them sharply. If a length of tyre does not now slip into the rim, press it down gently with the third lever inserted in the groove. This knack of pressing the groove down is quickly learned and exceedingly useful, but great care must be taken not to injure the rubber.

Having pressed the outer cover into the rim length by

length, using the hands if necessary, and rocking it to and fro to seat it correctly, now press it back a little way all round the rim and make sure that the inner tube is not nipped. If you see red rubber anywhere, regard it as a danger signal. Again, raise the security bolts to their full height by tapping upon them gently with the lever, press them up and pull them down to make sure they have not nipped the tube, then screw them home. Hammer softly upon the whole outer cover, turning the wheel slowly as you do so—this will insure a better seating of the cover. Pump up your tyre, sparing no labour, and being sure of the correct pressure before you put the pump away.

These are simple rules and are quickly learned. Of course, if a novice can induce an old driver to change a cover for him, he will learn more in half an hour than this book can teach him in six months. He should make himself familiar with all the details of the modern tyre; with the exact situation of the security bolts, the precise construction of the valve, the feel and look of a well-fitted tyre. When he is familiar with the work it really will not prove so very dreadful. Should he have to change not only the inner tube, but the cover, when upon the road, the above directions still hold good, but need to be slightly amplified.

He must now, having removed the inner tube, use his big fork lever also to remove the security bolts. He will then employ his smaller levers to pull the tyre from the inner side of the rim; and when he puts his new cover on he must first force it quite home in that inner side before replacing his security bolts. It is a good plan, when putting the new cover over the wheel, to fix it loosely upon the rim at one side of the wheel, and then press its edges closely together and lift them into the rim on the other side by sharply raising one of the levers. As long a lever as possible of the flat variety should be used to hitch the tyre over the rim at one side of the wheel, and then pressing the edges of the cover together upon the other side to seat it correctly there. Quit the rim with one sharp upward motion. You can almost fix your inner cover in the inner edge by

pressure from the wrists aided by the lever applied to the groove as before; and when you have fixed it you will immediately replace the security bolts and be ready for your tube. Indeed, the necessity of changing the cover bodily adds little to the labour entailed by the common puncture. Here, as elsewhere, it is the knack of the thing that is all-important.

I shall not attempt to disguise the fact, when addressing the would-be motorist, that tyres are likely to be his most considerable expense when he comes to possess a car. There is no doubt at all about this. I heard in the Autumn of the owner of a 100-h.p. Rochet-Schneider who offered a great firm of tyre makers £1,000 a year to keep his car supplied in tyres, and met with but a chilly response.

If men will drive engines of 60-, 80-, or 100-h.p., they must foot the bill, and foot it cheerfully. Even the possessor of a 40-h.p. car, should he make considerable use of it, will find himself £400 or £500 out of pocket at least at the end of his first year. It is necessary to state this frequently, or much mischief will be done. Motoring in its speedier phase is one of the costliest pursuits we can follow—racing and yachting apart. It is not until we come down to the small car, to the engines of 10-, 15-, and 20-h.p., that we may look for reasonable tyre bills and a pastime open to a moderate purse.

I think that the owner of a 20-h.p. car, should its tyres be sufficiently large and it be carefully driven, might well get through a fairly busy year upon an expenditure of £100. Or, again, the owner, say, of a little Swift or De Dion would have no complaint to make if his tyre bill were £30, or even £50, a year. Here is the chance, and the only chance, for the man of moderate means. The monstrous expense of those great cars is not to be denied by any candid person. Let the manufacturer warble to us as he will, we know the truth, and have learnt it some time by bitter experience.

I have taken the account books of three careful friends



of my own—each owner of a 40-h.p. car—and I find that their expenditure upon tyres for the year just ending has been £580, £667, and £700. They are careful drivers, they do not use their brakes madly, they do not dash up to corners and stop with violence. I doubt, nevertheless, if any one of them keeps his car at a less expense than £800 or £900 a year, nor does he consider himself unlucky when the total is but that.

## CHAPTER XVIII

### THE SMALL CAR

I AM often asked whether it is good enough to drive a little car. My answer invariably has been in the affirmative. I am not sure that the driver of a little car does not get more fun out of the business than the owner of a giant. I am quite convinced that the small car will eventually be a supreme delight to hundreds of thousands.

For remember that this small car is about to take the place of the pony-trap. It cannot quite do so at present because we have not yet reduced upkeep to a science; but the day will come, and come soon, when we shall so reduce it. And then there will be few of those now owning pony-traps who will not change them for the little car.

Granted that the first cost of the car is somewhat serious when compared with the cost of your pony and trap. A man, I suppose, gets a decent cob and cart for varying sums between £20 and £60. The cheapest of the little cars of our day is £100—and I see no prospect of immediate reduction. Against this, however, we must immediately set the cost of the pony's keep and of his limitations. One car, however small, will certainly do the work of three ponies; nor do I suppose that it will cost much more than the pony to keep, distance for distance. Perhaps the best proof of this contention is that those who have given up pony-traps for motor-cars are rarely known to return to their first love.

Nowadays, when these small cars can be bought upon *The Times* system—sometimes fairly, sometimes unfairly conducted—the difficulties of the first payments are less. And remember that the man who has been accustomed to looking after his own pony and trap is both a driver upon the road and

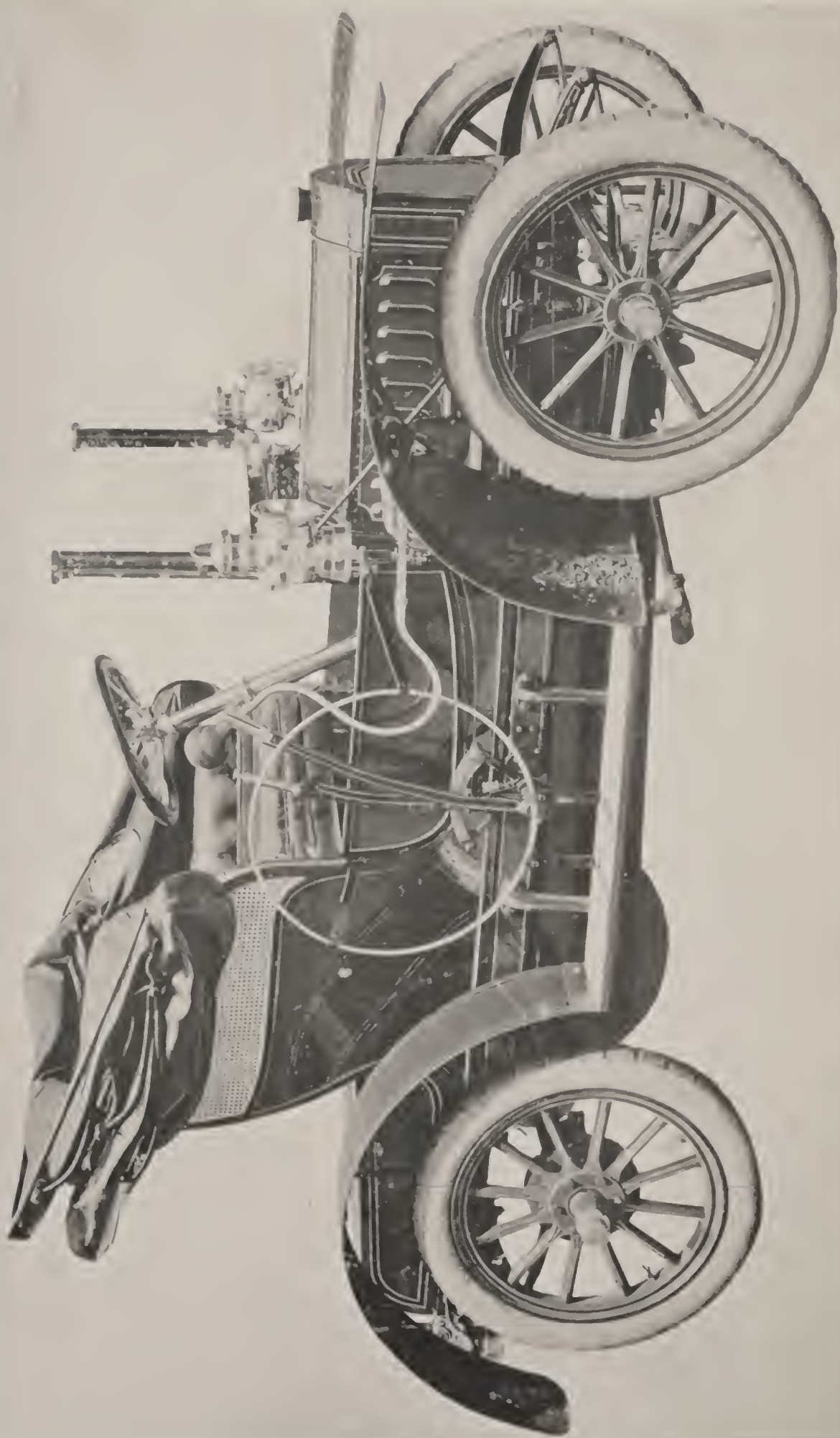
a student of self-help. He will look after his motor-car with a diligence which no chauffeur would ever bestow upon a thousand-guinea limousine. Every nut and bolt will be dear to him ; he will thumb books innumerable to get at first principles. Nothing but the best in the way of running will please him. Such cars are often efficient to the last degree ; and when they are thus efficient the pleasure that they give is uncontestable.

I have often said that I think the finest small car ever built was the old 6-h.p. De Dion. There are many of these running about the country to-day and giving all the old satisfaction. The new 8-h.p. De Dion, and the still later 10-h.p. with two cylinders, are worthy successors of this admirable vehicle ; but the 10-h.p., at any rate, begins to pass from the category of the small car and should not be considered under that head. It is curious in this respect to notice how, as time goes on, the number of small cars becomes beautifully less, and how many makers are tempted to desert an industry in which they have won great fame for another in which their prospects of success are dubious.

Of the De Dion higher-powered cars I know very little. They are no doubt built with all that care and thoroughness which characterise the work of this famous factory. But I shall always regret that they have ceased to make the 6-h.p. car and implore them not to treat us in the same way where the 8-h.p. car is concerned. We must have a small car from their house. It would be a calamity, should any one ask us to name a good small car, to be unable to respond immediately "the De Dion." The 6-h.p. De Dion, I say, has had its nose put out of joint by the 8-h.p. ; but luckily the Swift and others remain.

I wonder how many thousands of good people of very moderate means and moderate ambitions have first learned to know this England of ours through the instrumentality of the Rover car. Admirably designed some years ago by that able motor engineer, Mr. Lewis, the Rover, truly, has never looked back. You buy it, I think, for some £105 ; it runs you, heaven knows how far, on a gallon of petrol, and you will be





The 8-h.p. De Dion.



unlucky to want a second set of tyres during the first year, at any rate. A car of this kind has been maintained for as small an outlay as £20 per annum; even should the owner have to stable it in a garage, it could be kept reasonably for £50. Indeed, I know of few cars that one could recommend with more confidence than this.

This, of course, is not to say that there are no other good small cars upon the market. Happily there are many of them. For those who desire great simplicity of control I would name the Adams-Hewitt—now made in England; nor could one justly withhold a good word of praise for the little Darracqs, the Siddeleys, and the Beauforts. The latter company, I am afraid, has abandoned its famous 10-12-h.-p. car, which has always excited my warm admiration. No other instance is known to me of an amateur, supremely ignorant of motor matters, taking a car out of a maker's shop, and running it successfully for more than two years; but this happened in the case of the Beaufort.

A youngster, who had just left school, persuaded his father to buy him a 10-12-h.-p. Beaufort. He learned to drive it; he embarked upon what we all expected to be an amusing series of adventures; but lo and behold, the laugh was with the boy! It is true that he was once stopped upon the St. Albans road by a puncture, and not having the faintest idea how to mend it, had to take the train home. But the engine itself has not given him a moment's trouble. Although he knew nothing of it, and remained in ignorance for at least six months, it went as regularly as a sewing-machine, and as satisfactorily.

It must always be remembered that the small car is for many young men but a substitute for their bicycles. Perhaps they were motor-cyclists to begin with; they learned to manage the single-cylindered engine; they braved all the discomforts of motor-cycling, and turned to the small car expectantly—nor do I think that it has disappointed them. Soundly built, as a whole, the man who can manage the engine of a motor-bicycle can certainly keep the best of the small cars in order; and while he will never travel as



fast in it as he would travel upon his motor-bicycle, the social side of it, the greater comfort, and the utility of the car must in the end prevail.

Again, where country houses are concerned there is no substitute for the reliable small car. It will run in and out to the nearest town all day if you like; it will bring home the beef and the bacon, carry your luggage to the train, run you merrily to the golf links, take you quickly to the river. Standing in a dry shed, being carefully washed and oiled every morning, you have but to give a brisk turn to the starting-handle and your car is your willing servant. As time goes on there will be thousands of Englishmen who will come to understand the enormous possibilities attending so limited an expenditure. Indeed, I think that the motor movement of the future may tend more and more to the advancement of this little vehicle rather than to that of its more costly rival.

## CHAPTER XIX

### THE BODY OF THE CAR

THERE is some beautiful work done nowadays in the construction of the motor-car body—there are also some dreadful productions. I know no field in which the contrasts are more remarkable. Go to Holland & Holland, or Thorn, or Sayers, or Mulliner, or Rothschild, or Kellner, and you may get a motor body which is more beautiful than anything the old carriage industry ever showed us. Visit, on the other hand, the shops where they turn out “side-entrance phaetons” for the cheaper cars, and you will be offered trash which should not house a dog. Indeed, it is difficult for the unskilled critic to understand the care and the skill involved in the building of a successful motor body ; to have the front seats placed exactly where they should be, so to poise the driver that while his legs are not cramped he can reach the pedals surely ; to get the right angle for the back seats, to apportion the weight correctly. Ask a great builder about this and he will become a vocal encyclopædia upon the subject.

The majority of buyers, in despair, simply fall back upon a reputation. Tell any of the famous builders I have named what you want, and he is not likely to disappoint you. But remember that a fine motor body is expensive, and that you may pay any sum from £100 to £300 for it. I shall not here enter into the question as to what is the most suitable body for the modern car. I myself am an opponent of the limousine and landaulette except for purely town work. Writing for the amateur, who is going to drive a car himself, I would tell him that he will enjoy few of the finer pleasures of motoring in a landaulette and none at all

in a limousine. It is all very fine to tell us that protection from the weather is necessary. This we can get with a good Cape hood and a glass screen; but our ambitions are all for God's fresh air and that inconceivable exhilaration of travel which the motor alone can bestow.

For my part I would sooner take a train any day than drive a hundred miles in a stuffy limousine. Motoring loses its charm for me the moment I am boxed in. There is a sense of oppression in these closed cars which no amount of draughts—and draughts are there abundantly—can make good. The rattle of this class of car, the stuffiness of it, the limitations of it, are to me intolerable. I hear the laments of the lost complexion with indifference.

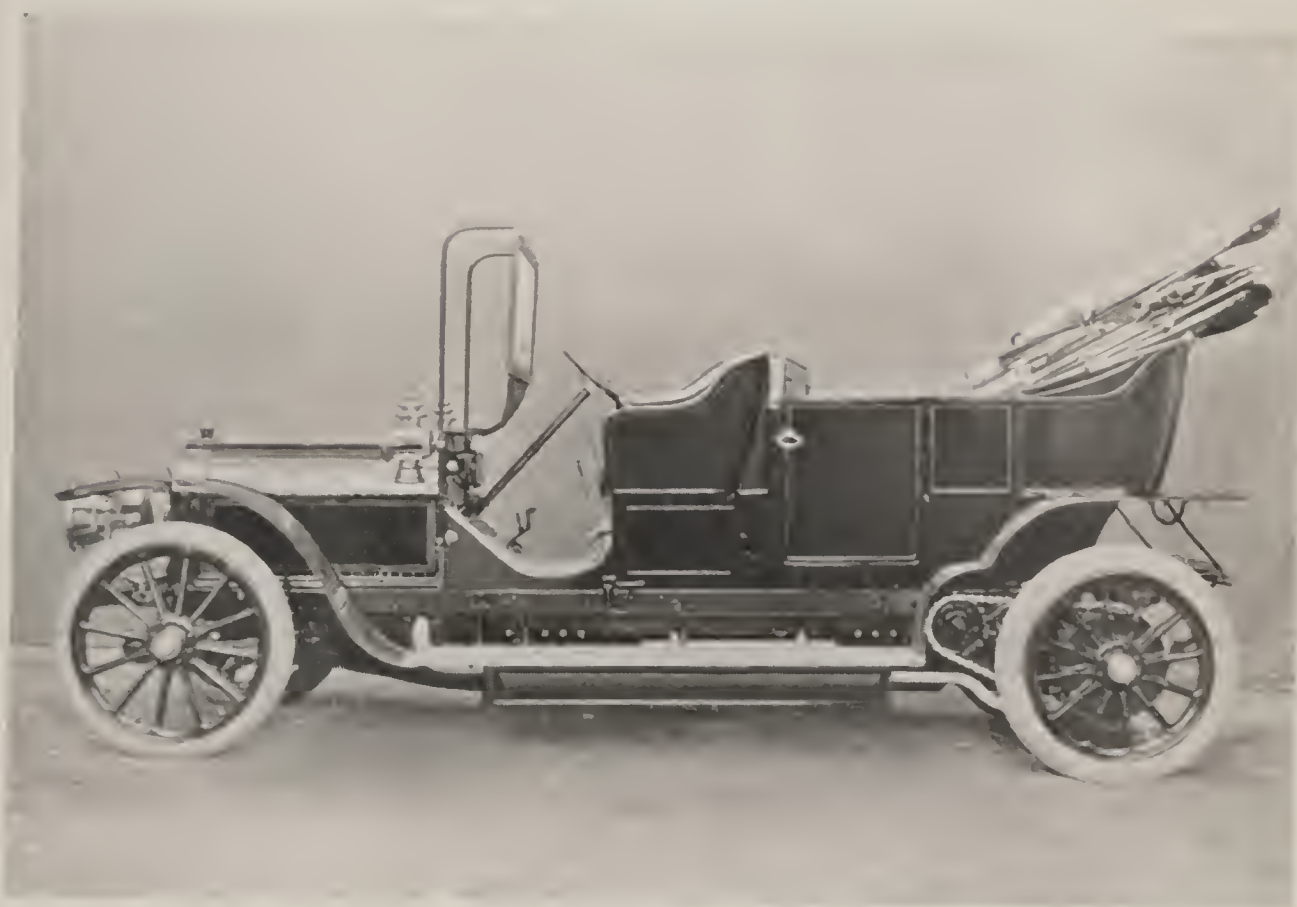
So you see I am all for the open car, but not upon that account the less an advocate of comfort. Some of the phaetons as now built by the greater houses are models of design and luxury—shapely at the back, but with the rear seats of a moderate height; plenty of space in the tonneau; good bucket seats in front and a compliment paid there to the long-legged man. I know nothing better than a good side-entrance for the purpose of touring. Its defects hitherto have not been hidden from us. The Cape-cart hood is a wretched contrivance and had many drawbacks. Many of us who resent the limousine and landaulette have, nevertheless, hungered for some protection against the weather; and have felt that there are times and seasons when, even if but for half an hour of our day, we should have been glad of such protection as the covered carriage would give us.

This, I think, we shall now get. I have recently seen in London a modified form of landaulette built by Messrs. Kellner of Paris which seemed to me as ingenious a thing as France has yet sent us. They tell me at the clubs that no self-respecting amateur could possibly drive his own landaulette; but here is a carriage which I venture to say that any amateur could drive—and drive with pride. This carriage has a hood of black leather, and, as part of this hood, are pillars for the windows which let into the side





The New Kellner Body (closed).



The New Kellner Body (open).  
(By permission of Messrs. Kellner et ses Fils.)



doors and the panels in front of them. When you lift this hood you lift the pillars with it, and almost instantly you can place them in position. The long black peak in front covers the driver completely and has a short roll of leather which is attached to the top of the forward glass screen. The second glass screen behind the driver's seat is for the protection of those who occupy the rear seats, and when, in addition, they pull up the side windows of this screen they enjoy all the comforts of the finest limousine that ever was built.

Used in an open form the carriage looks like an unusually handsome side-entrance phaeton with a black leather hood ; when the hood is up we have a somewhat unique combination of landaulette and limousine beautifully fitted inside, and just such a carriage as the owner may drive himself. Messrs. Kellner, of 125, Avenue de Malakoff, Paris, are the builders, and the cost of the body, I understand, is £260.

But why not a detachable body ? Why should the modern chassis serve but one purpose ? We are driving during the day, say, a hundred miles in the country, but at night we are for the theatre. Obviously, if the weather be bad, Madame will object to the side-entrance phaeton, stout as its hood may be. It is true that I have seen charmingly dressed women returning from the theatre during the season in cars which had not even a Cape-cart hood. But this was a tribute to the fourteen hours of English summer we usually enjoy, and we cannot look for such patronage in a common way. The brougham in some shape or other is the thing for a dinner or the theatre. Why, then, should we not be able to remove our side-entrance body on returning from the country and to slip on a brougham top in its place ?

Lieutenant Windham has answered this question for us. His detachable bodies are becoming very well known ; they are well and capitably made, capable of quick adjustment and by no means dear. I understand that for a sum of £250 you can have a racing two-seater, a single brougham and a side-entrance phaeton. It is claimed that one man can detach any body already on the car and substitute



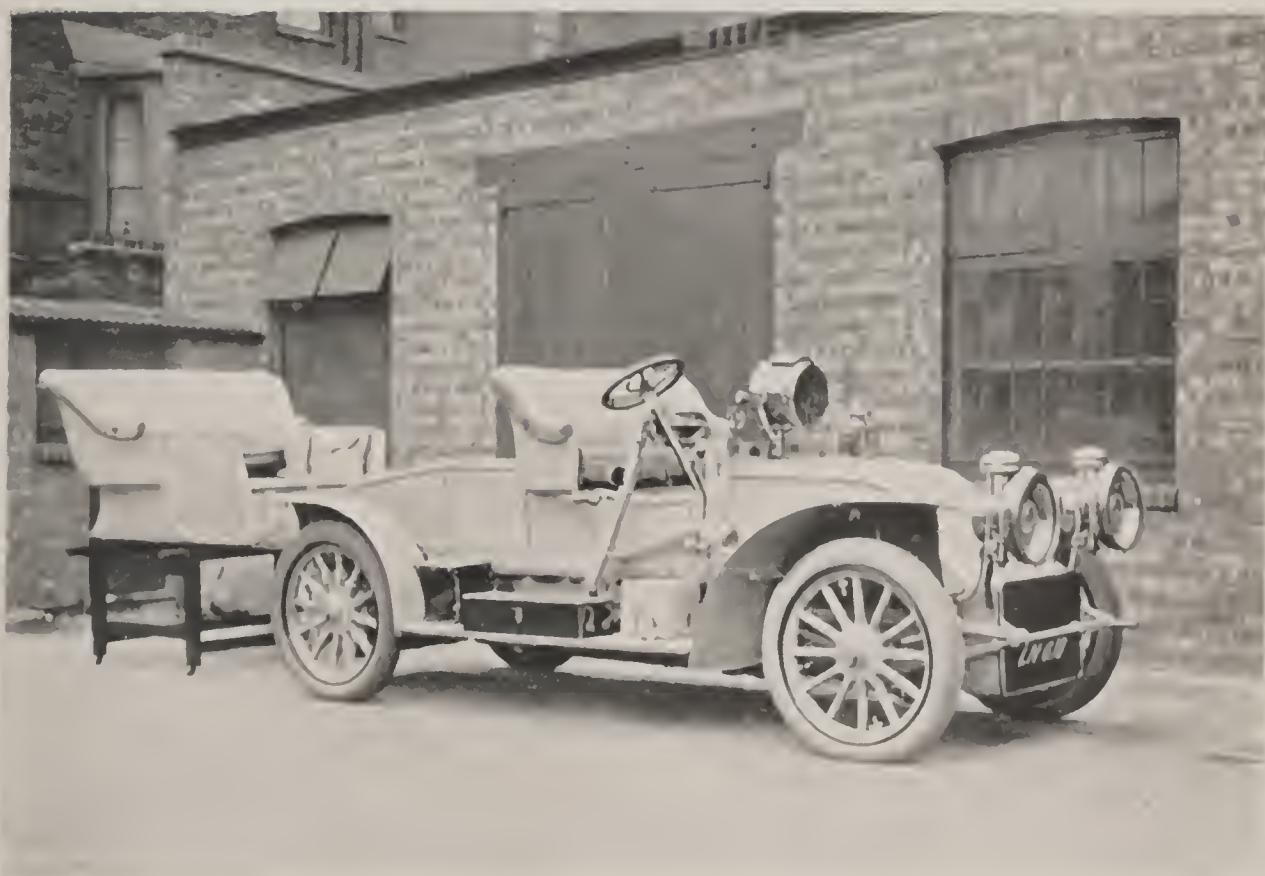
another in less than two minutes. Neither tools nor tackle are required. The bodies which are not in use stand upon high legs, provided by the makers. There is no apparent difference from the cars we commonly see in the streets—it would be almost impossible, I think, to detect without special examination the presence of a Windham body. And, clearly, we should save much in tyres by using only a “two-seater” when there are but two of us to go. The whole invention is so excellent, indeed, that I feel it is almost an ideal solution of the “one car or two” question. Let me add that Lieutenant Windham’s Works are adjoining Clapham Junction Station.

I am often asked what is the most suitable colour for the body of a motor-car. The question, I take it, concerns the best wearing colour, for it would be absurd to appeal to another upon a matter of personal taste. If we are to judge by prevailing practice, green would appear to be the most popular of all colours where motors are concerned. A West-End salesman tells me that he can always sell a green car in preference to a red, and that dark colours are invariably preferred for landaulettes and limousines. The fact is noteworthy, because red is of all colours the best wearing and, to my mind, the smarter where an open carriage is concerned. In the old days we had no such popular colour as “Panhard” red, though yellow proved a sturdy rival. The latter, I suppose, is a tradition of the old coaching days, though to me it remains an abomination; and of all combinations that of a green body with yellow wheels is not to be surpassed as an artistic infamy. I am glad to say that we are seeing less of it; indeed, multi-coloured cars are becoming rarer every day.

I can quite understand the fashion which dictates a dark colour for a limousine. Heavy cars readily become a terror to the natives if they are painted in loud colours. At the same time, I must contend that a limousine in dark red is a handsome carriage and that even royal blue is not offensive when the work is well done. The latter colour is ideal for



The Windham Detachable Body.



The Windham Detachable Body.





a lady's car. I know nothing prettier than a high phaeton, with a dickey behind, painted in royal blue and built for a lady driver. The old story that this is a bad wearing colour has been proved an absurdity. If blue be properly treated, it will wear almost as well as the famed "Panhard" red.

There used to be a fine old fiction of a story that white was a good wearing colour—a piece of utter nonsense, as time has proved. A white car with red cushions looks well for twenty-four hours, but, the moment the gloss is off, the paint is done for and can never be rehabilitated.

It is really astonishing how much good painting has to do with the smart appearance of a car. Any error of taste seems to cry aloud for judgment. I saw a car the other day with a yellow body, black wheels and bonnet ; comment was wasted upon it. If combination be desired, the prettiest of all is the French-grey body with crimson wheels. This wears well and is not really loud. The old coaching colours, for some reason or other, are rarely a success when they are used upon a motor-car. A blue body and red wheels are possible, but a yellow body and red wheels intolerable. Black is not a good colour, nor is chocolate—and, in truth, it seems to come to this, that there is just one shade of blue, one of green, and one of red which are putting everything else out of the market, and establishing themselves beyond contradiction.

Some cars are almost known by their colours. One is so accustomed to Napier green that it is almost difficult to believe that a Napier of any other colour "will smell as sweet." The eye plays tricks with us in this respect, and yet I saw a 60-h.p. Napier in red the other day, and would name it as one of the very finest cars I have ever seen upon the road. It was astonishing how well the long bonnet looked in this new colouring.

As to the minor fittings of the car, I myself like to see a well-filled dashboard. There should be a good eight-day clock there—not a twenty-four hour abomination ; a speed indicator, of course—one of Messrs. Smith's of the Strand for choice ; a couple of horns somewhere in the neighbourhood, a

small electric lamp—such as Messrs. Smith sell—fitted to the steering-wheel; possibly a good match and cigarette box, and lastly, but by no means least, the badge of the Automobile Association.

And here a final word as to your appurtenances. Never forget your luncheon basket. It will save you a considerable sum in the course of the year; and of all the pleasures of motoring, none exceeds that of the al-fresco meal by the roadside.

## CHAPTER XX

### THE SALE OF THE CAR

WHAT are you going to do with your car when you wish to sell it? And what do you expect to get for it? I have heard these questions frequently of late, and the replies interest me. Which is the best way to sell a second-hand car, and what loss should we be prepared to face? If we have run the car but for a single season and the make be a popular one, this loss should not be more than 33 per cent. It will rarely be less, and we shall be lucky to make a quick sale at the price. The plain truth is that second-hand cars are almost a drug on the market. Clever people—such as those at the Motor House—can do very much more than most of us, and there are other dealers who have won conspicuous successes. But in the main the business is a poor one for the seller, and the price obtained will often provoke the most dismal astonishment.

As a mere opinion I put it that it is very difficult to sell cars by advertisement. Week by week, sometimes year by year, do I read in the technical press the despairing advertisements of would-be sellers who have treasures to part with. Reading these descriptions you would imagine the man who did not hurry out to purchase the cars in question to be little better than a lunatic. He might just as well have missed the *Encyclopædia Britannica*. A closer inspection of the stock, however, would reveal terrible old crocks, toothless and asthmatic and dear at any price, for such is the charm of words. As a counterblast to this, that excellent journal, the *Autocar*, will examine old cars for you and tell you just what they are worth. Its system has done much for the seller and will do more, for the truth lies in a nutshell—that people



do not buy second-hand cars because they are afraid of being swindled. No industry in the world has given birth to such unscrupulous rogues as the motor industry, and these are seen at their best in the sale of a second-hand car. Men who doubt their own judgment prefer to go straight to an honest maker and buy a new thing. I certainly do not blame them.

If you would know the real worth of second-hand cars, attend some of the auction sales and listen. You will see Panhards which have cost hundreds going for fifties or less. By here and there an obviously fine car will fetch a big price, but the second-raters—why, I have seen one of 20 h.p. knocked down for £70, and I thought it dear at that. Surprise must attend these sales. Cars for which you are asked £300 in the advertisements will be sold at the auctions for £150 or even less. The mischief of it is that you never know how far they have been driven or how they have been driven. It is far more satisfactory to begin at the beginning, especially to-day when sanity regulates prices, and cars which cost £180 to build are not being sold for £1,000.

If you must sell a car in the spring, send it to one of the approved salerooms early in April, not before. Ask £50 more than you are prepared to take and do not expect any fairy godmother to come to your aid. Blessed is he that expecteth nothing, especially where second-hand motors are concerned. If you gave £600 for the car and it is a Panhard, you may get £350 for it. Panhards, in my experience, are the most saleable of all cars.

They are close pressed by Napiers, Daimlers, Mercédès, and Renaults, but they head the list just because the world knows their durable qualities and is rarely taken in by them. The fact permits me to offer good advice to the buyer. If he must buy a second-hand car, let it be a Panhard of recent date. He should obtain the number of the engine and have it verified in Paris, and he should take an expert with him to keep an eye on the smart young man whose only desire in life is to sell cars for much less than they are worth.

One of the dodges that used to be practised upon the novice was delightfully simple. Rogues bought up a number

of Krebs carburettors and fitted them to worthless engines not made by Panhard. When the innocent customer presented himself the rogues said, "It must be a genuine Panhard because it has a Krebs carburettor. Look and see for yourself." The youth, who had never heard of Krebs, and thought that a carburettor was something to warm the feet, used to look and see, and go home with an antiquity which was not a joy to him. It is amazing to remember how often and how successfully this swindle has been practised.

Cars are often sold by men who labour under a foolish delusion. A man drives a machine with some trifling defect, and he believes that if he sells it and buys another he will find himself in Eldorado. Nothing could be a greater mistake. Let us not forget that nearly every motor-car on the market has some point open to criticism. If one were to start making a catalogue of the little defects, even in the finest machines, there would be an outcry surpassing Babel, and yet one knows that the indictment would be perfectly true.

I met a man the other day who sold a fine Italian car because he had some trouble with the clutch. He bought a French car and discovered that the high-tension magneto was much better for starting purposes in the books than in his garage. After winding the handle of this French car for a week he bought a German car—one of the most redoubtable—and now he finds that he has so much trouble with the pressure valve that life is a burden to him. The moral is, that motoring is still attended by certain mechanical difficulties, however trifling they may be, and that it is sheer folly to sell a car at a big loss because we do not find it all the makers claim it to be.

# BOOK III

## SOME CARS OF OUR OWN TIME

### CHAPTER XXI

#### FROM THE MAKER'S POINT OF VIEW

MR. EDGE was saying the other day that there are now no bad cars upon the market. He meant by that, I suppose, that the failures of many years have not been without their fruits, and that there is no manufacturer so blatantly ignorant at the present day that he cannot keep his car running upon the road. Even three years ago it would not have been possible to have claimed this for some of the amazing swindles then put upon the market. There were bad cars enough in those days, but some of them were so bad that the makers should have gone to prison. It is this class we have eliminated—to our own safety and that of the non-motoring public.

I shall say frankly that for my part I make no attempt whatever in this book to deal categorically with the motor productions of the day. To do so would be to produce an encyclopædia of a singularly tedious and unprofitable order. Every man who has driven a motor-car for ten years becomes the victim of his own prejudices. There are certain cars which interest him, and others, perhaps equally good cars, which do not. Accident brings the wares of certain makes to his notice—it leaves him in ignorance of other wares which might profitably occupy his attention. So you find that as time goes on he is a Mercédès man, a Fiat man, a Napier man, or, at the best, a partisan of one or two well-known makers, and he will rarely hear a word to damp his own



enthusiasms. Preaching the gospel of the car he likes, he turns a deaf ear to other evangelists. Perhaps it is as well for the motor industry that this should be the case ; for if we were all buyers of the same car, heaven help our purses and the industry !

So it comes about that I have noticed in this chapter chiefly the cars which interest me personally. Where I have added occasional notes of others of which I know very little, it is because of their undoubted popularity, cheapness, or some other quality which has insured large sales for them. In the main part the makers themselves have supplied the information upon which these brief notes have been written. Here and there, as the reader will see, the article is frankly signed by a writer who has made it his whole business to exploit the car in question ; but in several cases, where I know anything of the car myself, I have added in a subsequent paragraph my own particular views.

This I think is a fair method—permitting the maker to speak for himself and the critic to hear anything I myself have to say for the car in question. Where there is but one article concerning any car, then, unless otherwise signed, it is my own, and must not be taken to represent the maker's view.

## The Argyll

In the progress of things automobile, each year's productions seem very near perfection—until they are reviewed in the light of next year's models.

In their 1908 chassis, the Argyll Company, while adhering generally to their past excellent design, have nevertheless improved and refined it in several important features. At the same time, and what is of vastly more importance, though less apparent to the general eye, they have been paying the most rigid attention to the workmanship and material of their cars. This is all the more commendable as the temptation and tendency in the motor industry have been to aim at quantity rather than quality. The Argyll people, on

the other hand, are making quality their first consideration, believing that a good car is their best selling agent.

It has always been the policy of the company to introduce a new model each year. They consider that the time has now come when they could with advantage produce a rather higher-powered car than they have hitherto undertaken.

The firm's energies will therefore be mainly concentrated on their famous 14-16-h.p. and their new 40-h.p. cars.

In all cars, the main proposition is the engine, and in this respect the Argyll cars are singularly fortunate. Their 14-16-h.p. has been universally admired for its extreme flexibility, quietness, power, and durability. To enumerate all the features which go to produce the above result would take too long. One or two points may, however, be mentioned. For instance, the crank-shaft is supported between each crank, making five bearings in all. As these bearings are all lined with white metal, and under forced lubrication, this part of the engine lasts indefinitely. Another point, though not at all obvious at first sight, is that an engine runs much better and lasts longer if fitted with long pistons, and has the gudgeon pin in the correct position. The Argyll pistons are unusually long, and very carefully fitted. The most striking improvement, so far as the engine is concerned, lies in the adoption of their new patent carburettor.

Realising that a great deal of the excellence of an engine depends on the carburettor, the Argyll Company some time ago started an extensive series of experiments, both with existing carburettors and new designs of their own, and as a result claim to have produced one superior to any at present obtainable. With this carburettor it is possible to flush the engine with pure air. This acts as a brake, and at the same time tends to keep the plugs clean, and by destroying the vacuum produced on a closed throttle, prevents oil from being sucked up the sides of the pistons. The auxiliary air can also be adjusted by means of the throttle lever.

It will be noticed that there are no sharp bends or pockets in the design, and in practice the picking up and slow running

qualities are remarkable, while a substantial increase in power and petrol economy is also obtained.

The control of the car, and, in fact, of all Argyll cars, consists of two small levers placed on the top of the steering-wheel, the control lever being placed in such a place that it can be conveniently operated with the left hand, and the ignition lever placed convenient for the right hand. This arrangement, taken in conjunction with the arrangement of the foot pedals, the left one of which operates the clutch, and the right one the foot brake, is considered ideal, as you have a pedal for each foot and a lever for each hand. Nothing, in fact, could possibly be simpler.

A much appreciated refinement is the friction control of the throttle and ignition levers. There are no triggers to pull or levers to depress; a slight touch either way and the thing is done, with a delicacy of adjustment impossible with any form of rack control.

After trying all sorts of leather, metal-to-metal, hydraulic and electric clutches, the flat plate clutch is still retained, having proved itself in smooth picking up, instant release, and holding power, superior to all others. To show how flexible the clutch and engine are, it is possible to allow the car to run backwards down a hill, and to pick up on the top speed.

The gear-box and gate-control are also parts which it has been found impossible to improve upon, and they are therefore retained. The short rigid shafts, spring control, wheels always in mesh, dog clutches, and positive stop for change-speed levers, are outstanding points of great merit.

Mention might be made of the neat and effective way in which the universal joints are enclosed by means of pressed steel hoods, packed with grease to prevent the annoying wear which often occurs in these parts.

Last year's back axle has given so much satisfaction that all its many features are retained. To make assurance doubly sure, however, the wheels are now mounted on the sleeves, and as ball bearings are fitted throughout, the utmost confidence may be placed in this important part of the car.



Not only do the individual parts of an Argyll car pass a most rigid inspection, but assembled parts, such as the engine, gear-box, and back axle are all run in for long periods before being assembled in the cars, thereby ensuring quiet running, and forming the skin on bearing surfaces which is so essential to their lasting qualities.

The new 40-h.p. engine has a particularly clean and mechanical look. Nothing is crowded, and everything is simple. All the valves are on one side, and an enlarged edition of the 14-16 carburettor is used. As the pump and carburettor are on one side, and the magneto and steering-gear box are on the other, a pleasing balance is preserved, while obtaining the utmost accessibility.

The four cylinders are cast in pairs, and fitted with a duplex system of high-tension magneto and accumulator ignition. The high-tension magneto may now be said to equal the low tension in reliability, while the accumulators give an easy means of starting. The flat plate clutch is adopted for this model, great care being taken to obtain plates of the proper hardness.

In this model a four-speed gear-box is used, having the direct drive on the third. This is now the accepted practice for high-powered cars, and possesses the advantage of doing practically all the running on the direct drive, leaving the fourth speed an indirect drive for the very occasional bursts of extreme speed which it is possible to obtain in this country.

The counter shafts run on single ball bearings, while double ball bearings are provided at each end of the main shaft, to take up the severe bending strains which come on these parts. The three-point suspension adds a finishing touch to a very compact and efficient gear-box.

The selector type of gate change is used, and a particularly effective design allows a delightfully easy and smooth change to be effected, the four forward speeds and reverse being operated by the same lever.

The back axle is also a very clean-looking job, and is of a different design for this heavier type of car.

In order to obtain the utmost strength for a given weight, the back axle casing is continuous across the driving-wheel. This places the cover facing the back of the car where it can very readily be got at.

The internal parts are so designed that it is possible to take out the driving-wheel and differentials without jacking up the car or otherwise distributing the axle. The road wheels, pinion spindle, etc., all run on ball bearings, causing a very sweet running axle, and ensuring the maximum efficiency.

The front axle is of unique and pleasing design. It is pressed out of steel plate, with solid ends forged on. In this way, neatness, strength, and lightness are combined to an extent which is well worth the attention of the intending purchaser.

In the above remarks, nothing has been said of the body work. Not that there is nothing to be said, but in these matters, personal taste comes so much into play that the number of designs is legion.

Suffice it to say that with the elaborate facilities obtainable at Alexandria, an extremely high standard of finish is maintained in coachwork as in all other details.

### *Specification of 40-h.p. Engine*

*Engine.*—Four cylinders. Cylinders cast in pairs. 120-mm. bore by 140-mm. stroke. All valves on one side, and interchangeable. Water circulation by means of gear-driven pump. Patent combined carburettor and throttle, the latter being vertical and placed close up to the cylinders.

*Lubrication.*—Forced feed by means of pump driven from rear end of cam-shaft.

*Cooling.*—Honeycomb radiator assisted by large and efficient fan.

*Ignition.*—Dual system. High-tension magneto, gear-driven, also battery and coil.

\* \* \* \* \*

The Argyll Company has always appealed to the man of moderate means. It is a great organisation conducted with

an excellent activity, and keenly alive to the requirements of the hour. The 14-16-h.p. car, at a price of £375, has amazed even enthusiastic owners. There is probably no car upon the market which, *cæteris paribus*, picks up so wonderfully or is more speedy upon hills. As other companies, the Argyll has known its misfortunes. But it has overcome them triumphantly, and the 40-h.p. car just now appearing upon the market cannot fail to interest a large public always interested in Argyll doings and very willing to recognise its directors' achievements. The price of this fine pattern is to be £650; but Argylls, of course, are to be had from £340 upwards.

### The Arrol-Johnson Car

There was a day when the South was not very kind to the Arrol-Johnson car. That was not a stone, but a wooden age, when monstrous vehicles came out of Scotland and terrified the people. Those who knew, however, were always loud in praise of the enduring qualities of the Scottish engine and of its reliability. When an Arrol-Johnson won the first Tourist Trophy Race in the Isle of Man opinions swung round in a minute, and the South recognised that this was a car to be reckoned with.

The Arrol-Johnson Company caters for those who desire vehicles of moderate power and of great reliability. Their new engines have many pleasing qualities; but, above all, they give very little trouble. It is, perhaps, the premier of the purely Scottish cars, and as such entitled to just honour.

### The Brasier

The Brasier car of 1908 is a marked improvement on previous models. Reliability has always been the aim of the makers of this car ever since the first model was produced in 1902, and that this aim has been accomplished is evidenced by the extraordinary success of the Brasier car in competitions. Winners of the Gordon-Bennet Race in 1904 and 1905, they



were the only team to finish in the Grand Prix of 1906 and 1907, besides gaining the gold medal in the Scotch Reliability Trials, 1906, and scoring non-stop runs in the Irish and Scotch Reliability Trials of 1907. With these records to its credit, it may be granted that the Brasier car is reliable in no ordinary degree.

Second only to their reliability is their extreme simplicity. The ignition is by low-tension magneto only, and the lubricator (by Hamelle) is mechanical, the oil being forced to the engine and bearings by pumps. This lubricator is absolutely reliable, and so long as there is any oil in the box it can be relied on to work. Each of the five pumps is independently adjustable, and as naturally the amount of oil distributed to the engine is proportionate to its speed, a more perfect system of lubrication could not be found. Special arrangements are made for turning off the oil, which is pumped direct to the cylinders and crank-chamber so as to avoid any possibility of smoking in towns, the splash in the base-chamber being quite sufficient for the engine when it is not working at full power.

The control is by means of the throttle only, the spark being fixed, and the car can be driven either by a hand-lever on the steering-wheel or by the foot accelerator. It is usual to set the hand-lever to a slow speed and drive with the foot, thus leaving the hand free. The steering is extremely simple; it is absolutely irreversible, and, being mounted on ball bearings, is remarkably sensitive and gives no jerks, nor is the vibration of the road wheels felt when travelling at fast speed.

The carburettor, which is heated from the exhaust in the 16-h.p. and from the pump in the 30-h.p. car, is a horizontal one with an entirely new supplementary air-valve. It is entirely automatic and consists of a cylinder and piston; as the suction of the carburettor increases with the speed of the engine, so the piston is lifted up and allows the supplementary air to enter in the lower parts. This makes an extremely sensitive and economical carburettor, and in the 30-40-h.p. the car can be easily driven twenty to twenty-five miles on one gallon of spirit according to the gearing of the car and

the nature of the road. As spirit is now largely increasing in price, the economy will be much appreciated by owners of Brasier cars.

The chassis is still made of pressed steel and reinforced by a tubular underframe. In this year's car the height of the chassis from the ground has been lowered : it is now 24 inches instead of 28. The front of the chassis is curved in, and the track of the wheels enlarged, so that the 1908 Brasier has very rakish and pleasing lines.

The gears are practically everlasting, it being the rarest occurrence for a new gear wheel to be required, and the change of speed is by the gate system. Ball-bearings are employed wherever possible in engine, gear-box, back axle, hubs, and steering, and the brakes are extremely powerful.

The Brasier is supplied in three sizes : 12-15 h.p., 16-26 h.p., and 30-40 h.p., the small car being gear-driven, and the other models gear- or chain-driven as required. One of the chief features of the car is that lightness has been attained without sacrificing strength, and the tyre bill of the owner of a Brasier touring car is, given decent driving, a low one.

The manner in which the cars are sprung deserves mention, as not only are very powerful springs fitted, but shock-absorbers are also supplied fore and aft, which makes it possible to use the cars with comfort over the worst roads. Hence their popularity in Ireland, where the roads are the worst in the United Kingdom.

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I have known the Richard Brasier for many years. Many of my friends were enthusiasts in the old days of the Georges-Richard, the firm which first put this excellent car upon the market. It was then known for many simple and striking innovations, thoroughly characteristic of a French engineer. The system of low-tension ignition on the Richard Brasier cars has always been one of the best and most reliable ; and although not too accessible in the old days, the question of accessibility rarely troubled the users.

The cars have always been on the light side ; but their wearing qualities, in spite of this, are noteworthy. Foolish prophets were only too ready to tell us after Théry's great victories on the Brasier car that it was not designed for touring. No greater mistake could be made. One of my friends has used an old 24-h.p. Georges-Richard for five years—driving it thousands of miles in England and France—and finds it but little the worse for its many adventures.

It has always been an exceedingly cheap car, at a price of between £600 and £700 ; but its newer models are even better value for the money.

### Brooke Car

Mr. Mawdsley Brooke, of Lowestoft, is a young engineer who has learnt much during the last few years. He is one of the first to admit the shortcomings of some of his more ancient vehicles ; but he has adapted himself to modern requirements with praiseworthy diligence, and is to-day as capable of building the highest class of car as any engineer in the country.

The firm has lately taken to the production of a six-cylinder car, which has been successfully submitted to the ordeal of a thousand miles trial. The new model to be put upon the market for the year 1908 promises to be both a speedy and a luxurious vehicle. It is quite one of the cheapest six-cylinder cars made, at a price of £750, and strikingly handsome.

This firm is, of course, quite notorious for the excellence of its motor-boats.

### Charron Car

In the year 1901, upon the great road to Bordeaux, I witnessed the fine driving of three noted Frenchmen—Messieurs Charron, Girardot, and Voigt. Within a year these three had combined to produce the famous Charron cars. Of the highest class from the first, the Charron has



never looked back. Quite the most striking carriage I saw in the year 1907 was a 40-h.p. Charron, in the garage at the University Arms at Cambridge. This engine possesses all the famous Panhard qualities, and has added something to them. Its durability is very praiseworthy. There are connoisseurs who will tell you that the Charron is the finest of all French cars—it is not impossible that they are right.

No doubt the high price charged for a Charron has done something to militate against its popularity ; but there is no reason why this should be the case. A Charron is as well worth the price charged for it as any car upon the market. Men do not sell their Charrons, they keep them.

## The Clément

BY A. MOSSES

For length of life we have yet to see the car likely to attain a greater or more honourable old age than the Clément. Cars of the Clément manufacture built in 1901 and 1902 are still running about as gaily as ever. I remember that Colonel Bosworth, chairman of the Automobile Association, was kind enough to write to *The Car Illustrated* in 1906, giving his reasons for selecting a Clément to carry him in his very important and useful travels in connection with the Society. The gallant Colonel remarked :

“Because I drove a Clément car fifty thousand miles (a distance approximately equivalent to twice round the world), without the slightest mishap except a broken wheel, the consequence of severe impact with a spur-stone, occasioned by a bad side-slip. The last time I sat in her she went as well as ever, and showed a clean pair of heels to a friend of mine who was driving a costly vehicle of very well-known make, and of considerably higher power ; moreover, our relations terminated most satisfactorily, for I sold her exceedingly well. On the principle, then, that ‘one thinks highly of the bridge that carried him over’ I ordered another Clément.”

I remember driving with my friend, Mr. Ben Wayte, of

Dublin, from Dublin to Belfast, over 100 miles, in less than four hours, using less than four gallons of petrol, on a little 12-16-h.p. Clément constructed in 1903, which, in one of the best-known hiring businesses in the United Kingdom, had covered 60,000 miles in its arduous life.

Mr. Money-Coutts is kind enough to write me, that the little 12-16-h.p. Clément (his adventures on which have been so ably set forth by him in *The Badminton*), now well on in her fourth year of life, runs as well as ever. He states that he got Messrs. Thrupp & Maberley to build a new body for her, and that she looks quite up to date.

I claim for the Clément that no car is more economical in running, and I bear in mind that the 10-12-h.p. Clément driven by Mr. P. Hallinan in the Irish Trials of 1905, made the extraordinary performance of 46 ton miles to the gallon; that George Brand in last year's Tourist Trophy Race was successful in covering the arduous Isle of Man course on less petrol per ton mile than any other of the numerous competitors; that this year in the Scottish Trials, out of twenty cars in its class the 18-h.p. Clément was successful in obtaining third position for petrol consumption, averaging more than  $23\frac{1}{2}$  miles to the gallon, over the worst roads and hills in the United Kingdom, despite the fact that most of the roads were on several days like ploughed fields on account of the heavy rains.

Economy in running, too, is shown by the kindness of the Clément to its tyres. Those used in the Scottish Trials had covered over 1,000 miles previous to setting out for Scotland. I drove from London to Glasgow (a distance in a roundabout way of 450 miles), through the Scottish Trials (a further 750 miles), back to London (a further 450 miles), and the same tyres are running now, and look good for another 1,000 miles at the least.

Again, silence has always been a strong feature of the Clément. In 1902 and 1903 the Clément cars were considered among the quietest on the market; and although since that date it has almost been a *sine quâ non* for cars to be noiseless, the Clément still upholds her reputation, and I agree with

our many friends, who still speak very highly of it in this regard.

Last, but not least, I claim that no trouble has been spared by the manufacturers to employ the very latest methods and adopt the very latest improvements in Clément construction. Unlike the usual practice of building many cars in huge batches of 1,000 to 2,000, the Clément cars are built only in series of 40 to 50; and in the event of its being possible to apply any new ideas, these are effected without delay. Thus a Clément buyer may have either propeller-drive or chain-drive, high-tension trembler coil ignition in conjunction with magneto, operated from the same switch, or two entirely independent ignitions. Chain-cases are fitted to all chain-driven cars, rendering this type as quiet as a propeller-driven type, with the advantage that a change of ratio can be obtained quite quickly, and with little trouble.

So simple is the control that a child may drive a Clément car, providing the police authorities would be kind enough to allow it, and the fact that there are several ladies who have driven their own Clément many thousands of miles incontestably justifies the Clément claims for reliability and simplicity of control.

## The Crossley

BY CHARLES JARROTT

In the first place, it is a continual source of gratification to me to know that I am selling a car manufactured by a firm of such wide-world reputation as Crossley Bros., Ltd., of Openshaw, Manchester, the famous gas-engine makers.

The manufacture of thousands of internal combustion engines by Messrs. Crossley, of Openshaw, Manchester, during the past few years has resulted in their obtaining an experience quite unique amongst motor-car builders, and I think the first point I would claim for the Crossley car is that in it the wide and varied experience of many years is shown to the full. As everybody knows, experience always tells, and I cannot



help but think that the Crossley car has an advantage over every other make of car by reason of the experience of its builders. Secondly, apart from the ordinary workshop experience of Messrs. Crossley, their car has received the benefit of my ten years of road experience. One does not drive many thousands of miles on practically every type of car without learning a great deal. Nearly every car has its good points, and it is only by use on the road that each good point is appreciated ; and in the design of the Crossley the makers have endeavoured to embody each good point, based on hard practical road experience.

Now, in connection with the other features of the Crossley, it will be well to study them one by one, in order to see exactly how the manufacturers have succeeded in building an up-to-date, luxurious motor-vehicle, capable of fulfilling the requirements of every reasonable user.

One of the principal ideas underlying the Crossley design is that the car should be reliable. Reliability is an absolute necessity—no trouble, no breakdowns, and the possibility of mapping out a time-table and of running to it to a minute. I do not think I am exaggerating when I say that the chief cause of trouble in connection with up-to-date automobiles is with the ignition. Arguments for and against one form of ignition and another are put forward by various and interested persons ; but in the construction of the Crossley the makers were not prejudiced in any way, but had one idea—namely, to select that which gave the least trouble. They therefore followed the lead of the famous Mercédès, and fitted low tension ; and I do not think that the greatest opponent of low-tension magneto ignition can deny that it can be relied upon absolutely. The ignition is mechanical, automatic, and simple, and therefore one of the best points to be claimed for the Crossley car is that it is fitted with low-tension magneto ignition.

Lubrication is another very important matter in connection with a motor, and this is also achieved automatically and in such a manner as to make it certain of the engine receiving its proper quantity of lubricating fluid. Clutch troubles are

unknown on the Crossley car, because the clutch is of the metal-to-metal type, is absolutely positive, and adjustment is simple ; this is therefore another feature which makes for reliability in the car.

After reliability comfort is demanded, and here again the knowledge of what is necessary to secure luxurious suspension is employed. The Crossley is fitted with exceedingly long springs to counteract road shocks and to render the car comfortable at any speed. In place of the usual spring hangers attached to the rear of the frame, semi-top springs are employed to assist the springing of the car. The gate change-speed is arranged in such a form as to do away entirely with the shock of changing gear which is experienced on most cars.

Silence.—Any one hearing the Crossley engine run is astounded by its extraordinary silence. Only one model is made—namely, 30-40 h.p., giving about 45 b.h.p.; and to hear the engine tick slowly round, so silently as to make it almost impossible when on the car to know whether it is running or not, is an education in itself on the capabilities of a really great firm of motor makers. Silent running is as necessary as a silent engine ; and on this point it will be noticed that the Crossley has entirely given up the use of chains, and that the top speed is direct to the back axle, so that the movement of the car is without noise and without shock—in fact, really luxurious movement is achieved.

Ease of Control.—One of the most important things in connection with a powerful car is that all its various functions should be carried out in such a manner as to leave the car entirely under control of the driver at any and every speed, quick to respond to the throttle, and easy to control on the brakes, whilst at the same time the steering should be so free and comfortable to manipulate as to render the car controllable by the driver with only one hand.

The ease with which change of speed is effected on the Crossley car is extraordinary. It can be said of very few cars that the gear can be changed from second to third and from third to fourth speed without declutching ; yet this is

possible on the Crossley car without the slightest difficulty or damage to the car.

There is one feature in connection with this car which always appeals to me—as it does when I find it in any other make—and the only word I can describe it by is “life.” A “sluggish” car is irritating. Quickness to respond, sensitiveness to every movement of the throttle, and obedience to every advance of the sparking-lever—these are a few characteristics of a really lively car, and they are certainly to be found in the Crossley to perfection.

No expense has been spared in turning out a vehicle worthy of Crossley Brothers’ great reputation; the best of everything has been employed; the detail finish is excellent; while the material is such as that specified by Crossleys themselves, and no one perhaps has had more experience.

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This fine car, as Mr. Jarrott points out, is made by the great firm of Crossley, of Manchester, the most considerable manufacturers of gas engines in the world. It is not at all astonishing that Messrs. Crossley should turn to the motor industry for a development of their business. Perhaps some of us were surprised that they did not enter the ranks at the outset.

Their last production is a car I have had the privilege of trying in Mr. Charles Jarrott’s company. I have said very willingly that I consider it in many respects the finest car that I tried during the year 1907. Not, perhaps, as efficient upon hills as the famous 40-h.p. Weigel, it possesses, none the less, such striking qualities of silence, flexibility, and vibration that nothing but praise is possible. The 30-40-h.p. model, which is the standard at the present, is a ridiculously cheap car at £700. In fact, there is nothing better at the price upon the market.



## The Daimler

BY E. M. C. INSTONE

Briefly expressed, the points claimed for Daimler carriages are : reliability ; efficiency ; simplicity ; accessibility ; ease of control ; and last, but not least, cheapness of price per horse-power.

The claim for reliability appeals in particular to the hesitating purchaser of a motor vehicle, especially if the claim can be substantiated, as can be all Daimler claims. Reference to the records of the Reliability Trials organised by the leading Automobile Clubs, and to the book of testimonials published by the Daimler Company, will establish the fact that Daimler cars hold a unique position in the matter of reliability. To enumerate even one-tenth of these public and private records would be to occupy more space than I have at my disposal, and hardly a month goes by without some fresh performance being added to the list. Only a few days ago news came to hand that in the recent Aga-Khan Reliability Trials in India a 30-h.p. Daimler was one of the few vehicles which made an absolutely non-stop run throughout the competition. Private testimony also is continually forthcoming ; and a book of testimonials which the Daimler Company is about to publish, showing letters in facsimile, will, I am sure, afford instructive reading to all who are interested in automobilism.

Of practically equal importance to reliability there is the quality of efficiency, and here again the claim for Daimler is substantiated by many undeniable proofs. Nothing demonstrates better the efficiency of a car than its hill-climbing performances, and I have no hesitation in saying that the Daimler record during the last three seasons takes pride of place. The performances achieved are all the more striking when it is considered that they have been made by standard Daimler cars which have been usually entered and driven by private owners. The record, therefore, which the Daimler Company can point to has not been achieved by the aid of

specially prepared and professionally driven vehicles, and this is a point which appeals largely to those acquainted with the inner workings of the automobile trade.

Simplicity of construction is Daimler's third claim, and no one who has examined a modern Daimler chassis can have failed to have noticed the absence of those superfluous and complicated fittings which many makers attach to their vehicles, apparently with the sole object of securing selling points. The elimination of these so-called "features" renders the Daimler chassis altogether remarkable for its clean unencumbered lines. This very simplicity of design materially supports Daimler's fourth claim—the claim of accessibility.

The maker of the intricate car not infrequently puts forward the argument that the design of his vehicle is purposely intricate to avoid the possibility of the private owner unnecessarily tampering with the working parts of the car; but I am of opinion that this argument is but a mere excuse, and that it finds small favour indeed with the practical automobilist. The ingenious design of the Daimler engine, base-chamber, the gear and cross-shaft cases, the commutator box, the hinged body, and other features special to Daimler cars all tend to allow of ready verification of moving parts, and the importance of this cannot, in my opinion, be overestimated.

The next Daimler claim is ease of control, and on this score I have no fear either of contradiction or even question. The Daimler practice of speed-change mechanism, by which each change of speed is effected by a full and positive stroke of a single lever, is too well known and appreciated to call for any lengthy description here. The use of this Daimler practice would in itself be almost sufficient to warrant one claiming ease of control for the Daimler car; but there is in addition the single lever engine control, which, placed above but independent from the steering-wheel, actuates both ignition and throttle, and permits the driver to obtain practically every variation of speed by the pressure of a finger. Yes, unquestionably the Daimler has every right to claim "ease of control."

As the sixth, and last, claim, I can perhaps for proof best refer my readers to that most interesting table drawn up by Mr. O'Gorman some months ago, and in which it is clearly shown that the Daimler has every right to the claim to be the lowest priced chassis per horse-power among all high-class vehicles. This is an all-important fact to purchasers, and more especially when it is considered that it is not brought about by the employment of either inferior material or workmanship. Everything in the Daimler is of the best; indeed, the car has been appropriately described in the press as "the motor triumph of the Edwardian era."

The Daimler cars for 1908 are as follows :

*Live-Axle Models.*

Type "A," 9 ft. wheel-base chassis fitted with—

- (a) 30-b.h.p. four-cylinder engine.
- (b) 38-b.h.p. four-cylinder engine.

*Chain-Drive Models.*

Type "B," 10½ ft. wheel-base chassis fitted with—

- (a) 42-b.h.p. four-cylinder engine.
- (b) 58-b.h.p. four-cylinder engine.

Type "C," 11½ ft. wheel-base chassis fitted with—

- (a) 42-b.h.p. four-cylinder engine.
- (b) 58-b.h.p. four-cylinder engine.

The horse-power quoted is in every case according to the Royal Automobile Club formula, and it is, I think, to be hoped that other manufacturers will also act upon the club's suggestion in this respect, and so enable the buying public to make, on a common basis, direct comparisons between the products of various firms.

The live-axle model is of entirely new design, with a bevel-gear live-axle transmission. The smooth and silent running of the engine has been ensured by enclosing the engine gears and cams. The usual Daimler design of a sloping valve and rocking lever lifter are retained, but there are being introduced



several important modifications in detailed construction. The transmission gives four speeds forward and a reverse, and has a direct drive on the third speed. Great care has been taken with the design of the universal joints, which have large working surfaces, and are arranged to be perfectly oil-tight and dirt-excluding. It is possible to take out all the driving-gear from the live axle, and leave the axle itself fixed to the car. Its casing is made in one piece from pressed steel, and presents a particularly clear appearance. The foot brakes are external bands operating on drums on the rear wheels, while the hand brake acts on a drum on the propeller shaft immediately behind the gear-case. The dimensions of the chassis permit of the attachment of a roomy five-seated body with good side-entrances.

Turning to the chain-drive models, my remarks on the engines fitted to the live-axle types also apply. The transmission has been rendered particularly silent by the adoption of a direct drive on the third speed, worm gearing in the gear-case, and a really sound and satisfactory design of chain-case. The chain-cases, which also form the radius rods, are made from light aluminium castings, and are absolutely oil-tight; they ensure the chain running at all times in a lubricated and clean condition. It is easy to adjust and inspect the chains, or entirely to remove the cases.

In the gear case itself there are two pairs of worms, one transmitting power when the direct third is engaged; the other when the first, second, fourth, or reverse gears are in mesh. As in the case of the live-axle model, the foot brakes act on the back-wheel drums. The hand brake operates on an extension of one of the worm-gear shafts in the gear-case.

These chain-driven chassis are of such dimensions as to permit of the attachment of most luxurious touring carriages, affording ample space both for passengers and luggage. That these particular features are appreciated is shown by the extraordinary number of long wheel-base carriages sold by the company during the past two years, and there is every indication that in the new vehicles motor tourists will find that ease of travelling and accommodation which they ask for.

## The Darracq

Monsieur Darracq has catered for the million. He has had his reward. No speedier cars for their horse-power than the 15-h.p. Darracqs have ever been built.

The company has lately introduced a six-cylinder car, of which we shall hear more.

## De Dion Bouton

Mr. J. W. Stocks sends me the following account of the De Dion Bouton models for 1908:

8-h.p. model A.L. 2, single cylinder.				
8-h.p.	„	B.G.	„	„
12-14-h.p.	„	B.H.	four	„
18-h.p.	„	B.I.	„	„
30-h.p.	„	B.J.	„	„

*8-h.p. Model A.L. 2.*—The specification of this chassis will remain practically as before, *i.e.* tubular frame one length only for two-seated or tonneau bodies, 100 × 120 engine with automatic inlet valves and expanding clutch gear. It will, however, have a front axle which will be in pressed steel of a grooved, curved section, and the wheels will be 750 × 85 instead of 709 × 88 as heretofore.

The chassis will be listed at £185 minus tyres. The tyres, which will be larger than before, will cost whatever extra the Tyre Companies' list may be during 1908, and carriage bodies approximately the same price as last year.

Complete car with two-seated body, £230.

„ „ „ four-seated tonneau, £250.

*8-h.p. Model B.G.*—The specification of this chassis in two lengths will remain as before, *i.e.* pressed steel frame 100-120 single-cylinder engine with mechanically operated inlet valve and automatic pump lubrication and De Dion patent plate clutch. The only modification will be in the gear, which will be

on the same double sliding pinion principle with vertical gate change as the 1907 10-h.p. and 30-h.p. models. The list price of the chassis minus tyres will be £225.

Complete with two-seated body, £270.

„ „ four-seated tonneau, £290.

12-14-h.p. *Model B.H.*—This will be an entirely new model, and one for which there should be a huge demand. The engine will have four cylinders cast in pairs, M.O.V.'s., 75 mm. bore, 100 mm. stroke, developing about 18 h.p., on the brake, with automatic lubrication, and will be fitted with high-tension magneto only. The carburettor will be automatic and only the throttle lever on the steering-wheel. It will have a light pressed-steel chassis, in two lengths, on the same line as the present 10-h.p. A.V., with a similar gear on the double sliding principle, three forward speeds and reverse. Wheels 810 or 90.

This car is a marvellous success, and has passed through its experimental stages on the road, and the results have surprised even the works themselves—which is saying a great deal—in regard to speed, hill-climbing, and silence in running.

The chassis minus tyres will be listed at £330. With tyres £360.

Complete with side entrance double phaeton body, painted to choice, £425.

18-h.p. *Model B.I.*—This will be practically a new chassis throughout, having an entirely new engine with four cylinders, 90-110 cast in pairs, M.O.V.'s., double ignition, high-tension magneto, and dry battery, although it will be quite easy to start the engine on the magneto, to which a trembler will be fitted. The distributor will be found in the same position as on current models. An automatic carburettor will be fitted.

The chassis will be made of pressed steel with four forward speeds and direct drive on the fourth. Wheels 820 × 120. List price of chassis minus tyres, £475.

30-h.p. *Model B.J.*—The engine with M.O.V.'s., and separate cylinders will remain the same as at present, but the gear will



have direct drive on fourth as on the new 18-h.p. model. List price of chassis minus tyres, £650.

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How much motorists owe to Count De Dion Bouton is understood, I think, but by few. It is my own opinion that his single-cylinder car did as much as anything to save the movement in its early days. Certainly, if it had not been for Count De Dion and the late Monsieur Levassor, the story of the motor-car would be very different.

That the single-cylinder De Dion is the finest single-cylinder car ever built I do not think there can be a doubt. Were I myself called upon to spend any sum less than £400 upon a motor-car, I should unhesitatingly buy a De Dion. Even to this day there are scores of little 4½-h.p. De Dions running about the country and giving their owners satisfaction enough. And some of these cars were built at the very beginning of the movement.

Whatever success De Dions may have with their larger models, it is to their small car that the motorist will turn with gratitude and continued expectation. Let it be said, also, that as a car for a lady to drive there can be few rivals to the De Dion Bouton.

## The Delaunay-Belleville

BY THE LONDON REPRESENTATIVE

The popularity of the Delaunay-Belleville car has progressed steadily since its introduction. Time is a great test of merit, and it speaks volumes for the Delaunay-Belleville that it stands practically alone as the car which has stood the test of three years without modification or radical alteration from the first chassis shown at the Paris Salon in 1904. Unlike any other car the Delaunay-Belleville does not have its body bolted to the frame in a complex manner which would make its removal, if necessary, a difficult task. The body is merely secured to the frame by four bolts, and there are no tubes, no wires, no connections of any kind to act as

impedimenta. Thus, should it be suddenly desired to use a closed body instead of the light open one, or *vice versa*, the transformation can be effected in a very few minutes. The advantage of this ease in removal of the body will be appreciated too in a case of accident or breakdown. Some part of the underframe, say, requires attention. In about ten minutes the bolts have been removed, the body pushed back on the longitudinal bars, and access is gained to the faulty part.

Another prominent feature of the Delaunay-Belleville is the metal-sheet covering which completely encloses the underpart of the frame—in front as well as at the back. This has the result of keeping the machinery quite free from dirt and dust and renders the cleaning of the car a comparatively simple matter. In this underpart covering are to be found two little doors which open and shut by a spring device. These enable one to inspect the most remote part of the motor's mechanism and to adjust the brakes without running any risk of soiling one's clothes in the process.

The underpart covering has another advantage about it which may be dwelt upon. By being rounded in the centre and sloping off to fine points at the back and front, it reduces the atmospheric pressure to a minimum, and prevents as much as it is possible to do the clouds of dust which are generally raised at the rear of a car when travelling.

The Delaunay-Belleville Works confine themselves to four-cylinder cars. This season's cars are of the following three types :

20-h.p. cars giving a brake h.p. of 28.

28-h.p. cars giving a brake h.p. of 36.

Lastly, 40-h.p. cars giving a brake h.p. of 50.

The general scheme is the same for the three types of cars. The makers, however, have made the 20-h.p. chassis in two types, the one driven by chains and the other Cardan drive, whilst in the two larger cars, viz. the 28-h.p. and the 40-h.p., the power is transmitted by means of chains only.

Each of the four cylinders is separate, and its two faces are symmetrical. Consequently one of the sides of the motor

carries a shaft with eight cams, four of which control the inlet and four the ignition. The other side carries a shaft with four cams, which control the exhaust. The former of these camshafts acts on the Simms-Bosch magnet by means of a special gear, whilst the latter causes the water circulation pump to work.

A carburettor of very simple construction, which, however, is properly placed and especially well designed, all its details having been carefully thought out, is fed with hot air from below and with cold air from the side, through the opening of an automatic valve. A ball regulator enclosed in a gear-case, as is the whole of the distribution gear, forces out of its place in the central chamber a diaphragm, the shape of which has been thought out with a view to allowing the current of gas to be sucked up in a really progressive manner. This enables all the cogs of the toothed sector of the steering-wheel on which the manette is placed to produce an actual effect of increase or decrease of speed—an effect which has never yet been accomplished in connection with the majority of manettes, for it must be admitted that hitherto they chiefly influence the speed of the motor in two or three positions.

The particular V-shape which has been given to the admission diaphragm of the carburettor is neither complicated nor sensational, but it nevertheless renders the motor exceedingly supple and once more proves that it is to the improvement of details that engineers will have to devote their attention nowadays.

The Delaunay-Belleville special system of lubrication is again a feature of the first importance. In our experience, many motors are lubricated from the outside, the heads of the connecting-rods coming into contact with the oil in the gear-cases, whilst the lubricator spurts oil on all the parts in motion and so on. In the Delaunay-Belleville car the lubrication is from the *inside*. The motor parts are hollow, and contain arteries (channels) through which the oil circulates, not only owing to its gravity or impelled by centrifugal force, but because the circulation is controlled by



a species of heart, while a double-action pump is for ever raising and forcing the oil throughout the circulatory system. Thus the oil is sucked up into the bottom of the motor, and forced not only into the bearings of the motor shaft, but into the motor shaft itself—not only into the heads of the connecting-rods, but into the rods themselves, right down to their lower extremities.

This system, let me hasten to say, is new only so far as applied to motors. After having been patented by Messrs. Delaunay-Belleville in 1897, it has been applied to hundreds of steam-engines ranging in power from 10 h.p. to 6,800 h.p. It will, therefore, be seen that it did not win its good-conduct marks without having been put to the test prettily thoroughly!

The transmission gear (chain or live axle) of the Delaunay-Belleville motors is remarkably simple, consisting of a leather-lined cone and no further mechanical formalities, even in the case of the more powerful cars. The speed gear-case is short and compact, with ball-bearings throughout of large proportions. It gives four speeds forward and one backward motion. It is formed of two parallel shafts, one on top of the other, and in the case of three speeds the change is effected by a "train" formed by a little fork, and by returning the movement from one shaft to another, whilst the fourth speed is by direct drive. The reverse motion is effected by interposing two pinions, which are afterwards brought back into their original positions by means of a helical spring.

It may be said in conclusion that every part of the Delaunay-Belleville's mechanism is manufactured by the makers themselves at their famous Saint-Denis works; only a few accessories, such as magnets and gauge-glasses, are obtained elsewhere.

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This car is the production of the great French boilermakers. It came to the front very swiftly. Oddly enough, one very rarely sees a Delaunay-Belleville in any other form than that

of a landaulette or limousine. For my part, I consider it to be rather a touring than a town carriage, although it is largely used as a town carriage.

The work in it is of high class ; but there are those who say that it is somewhat a heavy car to drive. This objection I am unable to understand. There is nothing in Delaunay-Belleville control different from the control of other cars. It is a powerful machine of the heavier kind, and one which appears to give very little trouble to its owners. Of the beauty of its finish I can speak from personal knowledge. In this respect there is nothing superior on the market to-day.

### The De Dietrich

BY W. M. LETTS

If I were to obtain the opinion of each user of the De Dietrich car as to the special feature he appreciates most in connection with his car, I am quite certain that with one accord the vote would be given to the feature of reliability. Other cars may have other claims, but the great De Dietrich claim is the important one of reliability combined with strength, and I am certain that no feature in any car can appeal to the user more strongly than this one.

The story of the famous De Dietrich house is a matter of automobile history, and I have no doubt that the position which Messrs. De Dietrich hold in the automobile world at the present time is due in a large measure to the fact that they were manufacturing motor-vehicles when many of the firms whose names are to-day household words in the motor world, had not commenced to think of such an enterprise. Messrs. De Dietrich have never undertaken anything in a half-hearted manner, and in their factory will be found the pick of French automobile engineers. In addition to this the firm is largely indebted to the services of Messrs. Turcat & Mery, the famous Marseilles engineers, who were experimenting, years before automobiles were allowed to run on English roads, in the perfecting of motor-vehicles ; therefore,

the famous De Dietrich has as its sponsors men skilled in the craft of design.

One thing I do not claim for the De Dietrich car, and that is, that it is a cheap car so far as initial cost is concerned ; but what I do say is, that the first cost is the last cost, and after all it is in the cost of up-keep that the expense of running a motor-car really occurs. We have had many flattering letters from users of the De Dietrich cars, all speaking in the highest terms, and the keynote of these letters has been that the car has cost practically nothing for up-keep. This proves to the full the success of the factory policy of never putting anything into the construction of a De Dietrich car until it has been properly tested, and it is quite certain that it is capable of fulfilling the work it has to perform with an ample margin of safety.

So I claim that so far as design and construction are concerned, the experience of Messrs. De Dietrich has enabled them to produce a car which for reliability is in the very forefront. The successes which have been achieved by the De Dietrich car in all parts of the world would fill many pages, and amongst the great reliability performances can be included the Circuit des Ardennes, the race for the Pyrenees Cup, and Delhi-Bombay contest ; but the most wonderful exhibition of reliability given by the De Dietrich cars was in the Circuit des Ardennes of 1906, when they finished first, third, fifth, and seventh.

Now, as to the running of the car. Care in the fitting and adjustment of the works secures that regular running which is one of the chief characteristics of the car. The engine is silent and regular, this result being achieved by the De Dietrich system of carburettor and mechanically-operated valves. Flexibility is another interesting driving point ; it only requires slight pressure on the auxiliary pedal, and the speed can be increased to four miles an hour, or forty, if necessary. The car is very easily controlled, simplicity is the keynote, and it is so easily manipulated that it is quite possible for a lady to drive it with ease. This is owing to the very effective clutch designed by Messrs. Turcat & Mery,



which was introduced for the first time on the car this year. It is very simple and cannot get out of order. There is no complicated disc or plates, yet it is a metal-to-metal clutch running in oil, and the charm of it is that when it is properly lubricated the trouble of the slipping or over-fierce clutch is not experienced.

Ignition is another great point of the De Dietrich, being of the simple make-and-break type. It is so simple as to make it possible for the veriest novice to use. A misfire is a thing unknown on a De Dietrich car. Quite recently I received a letter—one of many—which I think should be quoted, for it bears out my claims for the De Dietrich :

“It may interest you to know that my third De Dietrich is giving me as much satisfaction as the two older models I have had from you. The 1907 24-h.p. car has now done three months' hard work, and I have not had a misfire out of her.

“The new metal-to-metal clutch is excellent, and is the simplest form of clutch I have ever seen and used. The car is very fast and a splendid hill-climber, and altogether I am simply delighted with her.

“The old De Dietrich which you fitted with a landaulette body is running now just as well as ever, and she has done well over 30,000 miles.”

Another point which is of great interest to users of motor-cars is the question of tyres and up-keep. For some reason, which can only be explained by the design and perfect distribution of weight, the De Dietrich cars are exceedingly economical on tyres. In the many thousands of miles which I have ridden on a De Dietrich car I have never had one puncture. This question of tyre trouble is a very important one, and one to which many manufacturers have given no attention ; but I am certain that suspension and the distribution of weight have a great deal to do with the durability of tyres.

In fact, in driving a De Dietrich car, either on a long journey from London to North Wales, or from London to Scotland, you never have to ask yourself if anything will happen. If you are on a De Dietrich car you may be sure

that whatever journey you are going to undertake you will be quite certain to get through without trouble.

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This car, with the Panhard and the Charron, bears supreme witness to the skill of the French as motor engineers. The *marque* De Dietrich is a *marque* of which any owner may be proud. The car, I think, first established itself beyond question through Mr. Charles Jarrott's performance in finishing first on a De Dietrich in the memorable Paris-Madrid Race. There was an old 24-h.p. model built in those days which no one, to my knowledge, ever succeeded in wearing out.

It is not a cheap car, but it is one whose qualities are incontestable.

### The F.I.A.T.

Of late years, "Efficiency" is the watchword in every form of public and private enterprise. Therefore the fact that the F.I.A.T. does its work thoroughly and without grumbling—that is to say, without the necessity for perpetual readjustments and small repairs—entitles it to a place in the foremost rank. Its reliability may be equalled, but it cannot be exceeded in the present stages of motor construction and development.

During 1907 the first international event took place in Sicily. This was for the Targa Florio Cup which was won by Nazzaro on a 30-40-h.p. F.I.A.T., followed by Laucia, second, also driving a F.I.A.T. Each of these cars was of the actual type that is being daily sold to private persons for touring purposes. The route mapped out for the race presents more difficulties to the driver than perhaps any other in Europe. Forty-six cars of various nationalities were entered to compete in this great race, which was run three times round a course of about 93 miles, making in all a total of nearly 280 miles. The strain involved on the mechanism was enormous, as in every round the car had to be lifted over a mountain pass 3,600 ft. above the sea level, while the number of turns and corners is estimated at something like 3,000.

Again, the cup presented by the German Emperor ("Der Kaiserpreis") was won by Nazzaro on a F.I.A.T. car.

The third and greatest victory of all was won in the Grand Prix of France when the F.I.A.T., in competition with no less than 38 cars, representing the finest makes of France, Italy, Germany, Belgium, America, and England, once more achieved all honours.

Thus, in succession, the three greatest international events of 1907 have all been won by three distinctive types of F.I.A.T. cars, the regulations in each case calling for a different type of machine. So, what do we see? When maximum-bore rules, F.I.A.T. wins; when cylinder capacity controls the constructor, F.I.A.T. is again first; when fuel consumption is the limiting condition, then again is the Italian with his Italian car in the van.

Now, this is not luck—luck does not hold in such infinite variety. It is sheer merit—merit in man and machine—which has got home. In all these events the best car won, though how much its victory is ascribable to the brilliant helmsman cannot be stated in percentages.

What, then, of the car itself? What are its special distinctive features, which enable it to win and to justify its claim to be considered amongst the foremost of the day? To enumerate them all would be almost to reproduce the maker's specification. To begin at the beginning, a most admirable device, whereby the car may be started automatically without the necessity for dismounting and "turning the handle," may be mentioned.

The motor is so built as to be easy of access, and a special point is its quietness in running. One of the F.I.A.T. Company's most valuable patents is its automatic advance and retard of ignition. The ignition is low-tension magneto, and this device presents many advantages. The petrol consumption is reduced to a minimum.

Another important patent is the automatic oiler, which, beyond filling up, requires no attention whatever.

Great ease in driving is obtained by the automatic—one may almost say "spontaneous"—character of the devices



above-mentioned and of others. The brakes are qualified to meet any emergency, the clutch is beautifully smooth, all the gears are on ball-bearings and are run in an oil bath. The transmission is by roller-type chains, and thus the most perfect running is secured.

These are some of the reasons which have combined to give the F.I.A.T. car the premier place which it now enjoys. That such supremacy has been richly deserved in the past, and is being even more fully satisfied in the present, has been acknowledged in the public and technical press and by experts all over Europe. This is a record of which the makers of the F.I.A.T. may well be proud.

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The year 1907 has been a wonderful year in the story of the F.I.A.T. car. But this is no new story; and from the very outset the great Italian company made its mark in the racing story of the years.

As a touring vehicle it is impossible to say that its early productions were above criticism. The engineers, I think, were a little unlucky with their clutch; but none was quicker to recognise it than the famous designers at Turin. And there is no longer any possibility whatever of criticism upon this point.

The F.I.A.T. used to be called the Italian Mercédès. In a sense it was that; but it has never followed Mercédès practice slavishly and does not do so at the present time.

A remarkably speedy car, it is also a delightful engine to drive and one with many votaries. I do not consider the claims made for the F.I.A.T. car in any way to be overstated.

## The Hotchkiss

BY CAPTAIN CORBET

It will generally be conceded that reliability and durability are the greatest desiderata in the motor-car of to-day, and it is precisely these qualities which the Hotchkiss Company has

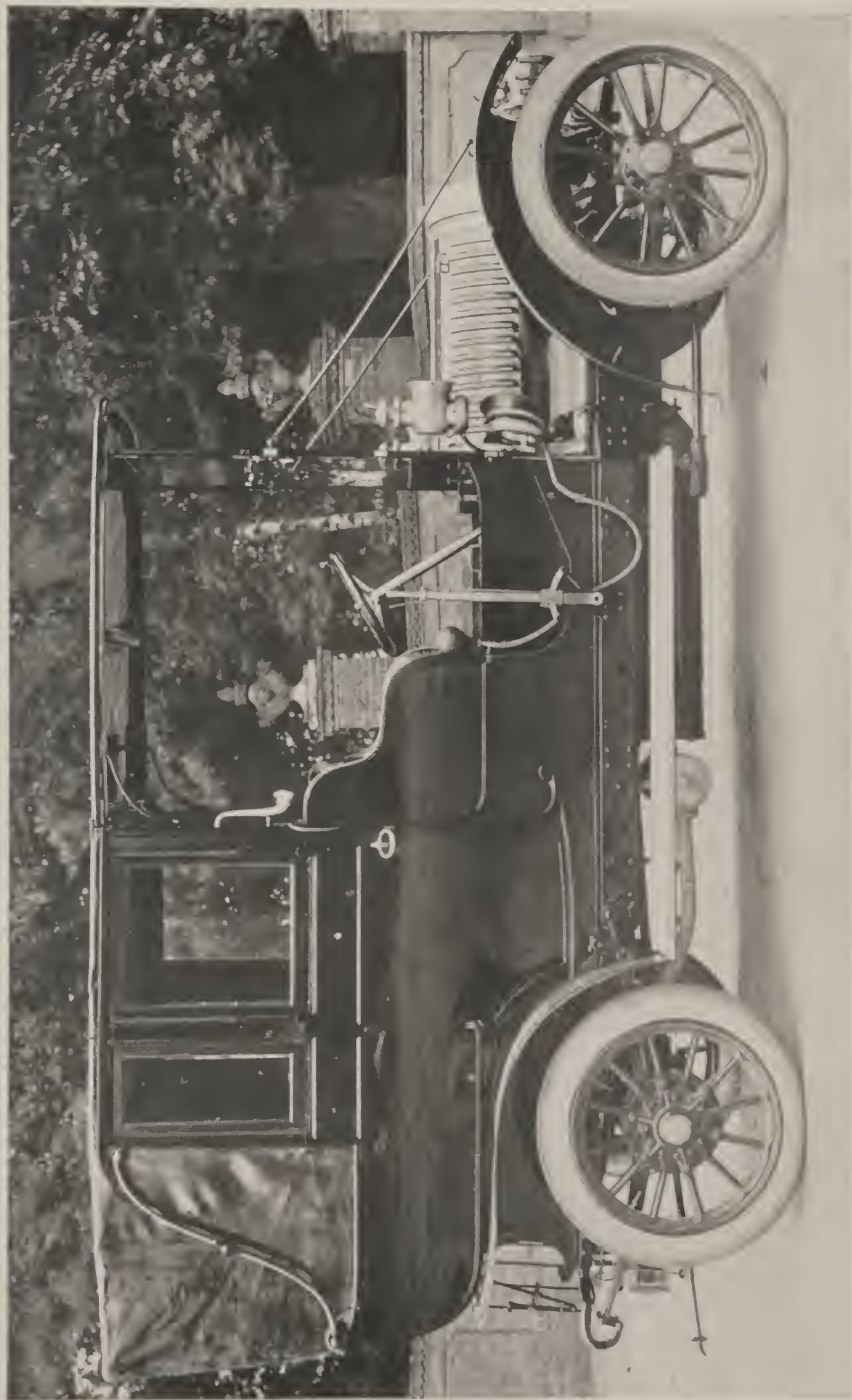
ever had in view, and which it to-day claims as pre-eminently the attributes of the Hotchkiss Car. And, indeed, this is no idle boast, easily made and with difficulty disproved. These qualities are only arrived at as the result of infinite trouble and research, both as regards design and material used ; experience, in motor-car construction as in all other things, is the best teacher.

To obtain reliability three things at least are essential ; viz. excellence of design, highest quality of material to be used, and skilled workmanship. It is here that the Hotchkiss Company must necessarily obtain a considerable advantage over rival manufacturers, inasmuch as it is able to bring to bear on the construction of the Hotchkiss Car the experience gained in the manufacture of quick-firing guns for which the Company is world-famous. The highest grade of material employed, and the infinite precision of the workmanship, which are the *sine quâ non* of good construction, are reproduced in the automobiles turned out by the Hotchkiss Company, and it is by this means that the reliability, so often and so amply demonstrated, of the Hotchkiss Car is arrived at.

In this connection it may be of interest to point out that a six-cylinder 45-h.p. Hotchkiss Car is at the present time about to conclude the longest and severest road test to which an internal combustion engine has ever been subjected.

Starting from Paris in the month of February last, this car travelled round France, a distance of no less than 6,250 miles, without giving the slightest trouble of any sort, or occasioning any involuntary stop throughout its long and trying journey. On the conclusion of this test, this car was shipped to England, and forthwith started out on a 15,000 miles trial in this country, under the official observation of the Royal Automobile Club. Up to the present time I am happy to say that the car has completed considerably more than two-thirds of its arduous journey without the slightest trouble or stop in respect of its engine, its gears, or its transmission, and doubtless by the time these few lines appear in print it will have covered the full distance of





A Hotchkiss Limousine.





21,250 miles, the longest and most trying test known in the history of automobilism.

Day in, day out, in all weathers and on all roads, the Hotchkiss Car has continued the even tenor of its way for nearly six months, and I feel confident therefore that those who may peruse this short article will recognise that the claim of reliability and durability which I have made on behalf of the Hotchkiss Car is made in no irresponsible spirit, but is based on experience and conscientious tests, as all claims should be.

At the November Show at Olympia the London and Parisian Motor Company, Ltd., of 87, Davies Street, W., are introducing an entirely new type of Hotchkiss specially designed to meet the modern requirements for a high-class car of moderate horse-power and price. The specification is as follows :

Motor, 4-cylinder 16-20 h.p.

Dimensions, bore 95, stroke 110.

Ignition, high-tension magneto.

Control, by lever on steering-wheel and accelerating-pedal.

Clutch, leather cone.

Lubrication, mechanical.

Change-speed gear, gate with four speeds and reverse.

Brakes, two expanding.

Frame, stamped steel.

Wheel base, 9 ft. 6½ in.

Wheels, equal 875 × 105.

This design has been tested to be speedy, a good hill-climber, light, and, being made of the same material as the celebrated 6-cylinder, it is a car of the very highest class. It is expected to compete more than favourably with cars of an equivalent horse-power and price.

#### *Specification of 6-cylinder Hotchkiss*

Motor, 6-cylinder 40-50-h.p.

Dimensions, bore and stroke 120-140.

Ignition, Eisemann magneto.

Control, by lever on steering-wheel and accelerating-pedal.

Clutch, leather cone.

Lubrication, mechanical.

Change-speed gear, gate with four speeds and reverse.

Brakes, two expanding.

Frame, stamped steel.

Wheel base, 11 ft. 1 in.

Track, 4 ft. 7 in.

### *Specification of 4-cylinder Hotchkiss*

Motor, 4-cylinder 30-40-h.p.

Dimensions, bore and stroke 120-140.

Ignition, high-tension magneto.

Control, by lever on steering-wheel and accelerating-pedal.

Clutch, leather cone.

Lubrication, mechanical.

Change-speed gear, gate with four speeds and reverse.

Brakes, two expanding.

Frame, stamped steel.

Wheel base, 10 ft.

Wheel track, 84 ft. 7 in.

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Speaking of the Hotchkiss 6-cylinder car at the beginning of the year 1907, I ventured the opinion that it was the simplest and the most striking of all the 6-cylinder models to be seen at Olympia. The performances of the car upon the road have justified this opinion.

Nothing more remarkable, surely, has been done than the reliability trial which the Hotchkiss won during the past year. To achieve some thousand miles without an involuntary stop is to stamp this car as a unique production upon which eulogy would be wasted. Those who are willing to spend £900 for the highest class of 6-cylinder car cannot afford to pass by the Hotchkiss's claim.



## Humber Car

Humbers are doing great things for 1908, and are giving us one of the cheapest four cylindered cars ever put upon the market. News of this has naturally been very welcome to the man of moderate means.

Humber enthusiasts in this country now constitute a strong body. I have seen as many Humber cars upon the road this year as any, and they are well spoken of. Those who desire a cheap car might go farther and fare worse.

The firm made its first real success, perhaps, with the little 10-12-h.p. car of 1906. They were wonderful little cars and rarely wanted an enthusiastic owner.

## The Itala

BY THE LONDON AGENT

The success of the Itala car as victor in the great Paris to Pekin race has brought this automobile very much to the fore this year. Such a course as it was driven over by Prince Borghese in this race would put any car to its severest test, and it speaks volumes for the Itala that it should have covered so great a distance with so little mishap.

But it is not solely on contests of this kind that the car's claim to distinction rests. We prefer to judge its merits by the favourable criticisms passed on it by those individuals who have used it for private purposes. And their praise of its qualities is unanimous. "I have never driven a car that is so silent in its running, or one requiring so little adjustment and care": that is the verdict generally pronounced. The claim of the Itala to be considered an automobile *par excellence* is, therefore, not lightly to be considered.

Its design is, to use a technical expression, the "cleanest" of any car made. It is quite simply constructed, with the fewest parts possible, and the workmanship and finish leave

nothing to be desired. So highly finished and polished is the machinery that cleaning is rendered particularly easy, there being no rough surfaces that can collect or hold dirt. This is a feature of the car which every motorist of experience will appreciate as of great importance.

The engine is four-cylindereed, the motor cylinders being cast in pairs. The inlet and exhaust valves are mechanically operated and interchangeable. The firing is by the Simms-Bosch low-tension magneto, and can be advanced from the steering-wheel. The throttle can also be regulated from the steering-wheel or by a small pedal, which enables the engine to be run at a speed varying from 150 to 1,200 revolutions a minute.

The cooling system—always a thing of importance—is the usual one, with a gear-driven pump and honeycomb radiator, and when full the system holds three gallons of water. The cooling is perfect in traffic, and the loss of water through evaporation has to be made up but seldom.

The carburettor is absolutely automatic, and produces a perfect mixture at whatever speed the engine is run. The clutch is composed of metal discs, and is very progressive. There are four forward speeds and one reverse, controlled by one lever with a device which prevents more than one speed being engaged at the same time. There is a direct drive on the top speed.

In the matter of brakes the Itala is well served. There are three in all, two controlled by separate pedals and acting on the main shaft, and the third controlled by a side hand-lever acting on the driving-wheels. One of the foot-brakes is water-cooled. The 20-h.p. model has only one foot-brake, which is water-cooled.

Transmission is by Cardan shaft with special compensating joints.

The main lubrication to the engine in the Itala system is by a chain and bucket lubricator which holds over a gallon of oil, and is driven at a proper speed in relation to that of the engine. It is a most simple and effective system, as experience has proved. In the 1908 model a new feature will

be oil pipes attached to the walls of the cylinders, in place of the splash system formerly adopted.

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Paris to Pekin has placed the Itala car beyond the reach of criticism.

Here we have another engine which has been called the Italian Mercédès. In plain truth these great Italian cars are very much alike, and there is very little to choose between them. The Itala is an exceedingly powerful motor with few unconventional features. Some of us think it has a tendency to overheat, but this has been checked in later patterns. Like the F.I.A.T. it is very fast and a superb car. Indeed, the success of Italian engineers in the motor industry is one of many surprising phases of these later times. A high-priced car, but one well worth the money asked for it.

## The Lanchester

BY FREDERICK W. LANCHESTER

The claims made for the Lanchester car embrace those of silence, safety, and simplicity. These appear to resemble those made by all motor-car makers, but upon analysis one will see that no car can more truly than the Lanchester advance a title to these qualities.

Silence.—From the first public appearance of the Lanchester car at the Richmond Show in 1898 up to the present day, one outstanding quality has been conspicuously evident in this car, viz. the quietness of motor, gearing, and transmission. The balanced motor, the epicyclic gear, the silent worm-drive, all alike have contributed to the sweet running of the car as a whole, and have obtained for the Lanchester a continued and increasing patronage.

Safety.—This claim is one that is too often overlooked. In past days, when the floor height of cars was much greater than to-day, Lanchester cars were constructed with the body work hung low. To-day the aim of all motor-car constructors



is in the same direction, so that the great advantage of safety is obtained. Cars, thus being well balanced, an accident upon the ground of balance is rarely heard of, and there is the added advantage of easy access to the carriage. On these points no car equals the Lanchester car of to-day.

**Simplicity.**—Simplicity is a quality that our critics for years denied us in our cars, but to-day the most ardent believer in the Continental type of car cannot maintain that the type he supports has any point of advantage over the Lanchester in simplicity. The engine of four or six plain vertical cylinders, high-speed type, presents no difficulties; the epicyclic gear—complex in construction, yet now admitted to be everlasting in working—is simple in control, and is daily coming more into use owing to its absolute reliability. The worm-drive employed is a form of gear that has stood the test of seven years' road trials. Lanchester cars equipped with this gear in 1901 are still running with the worm as originally fitted; no chain breakages or broken bevels are to be recorded.

For controlling the speed of the engine, the customary method of throttling is employed. There is a separate throttle valve to each cylinder inlet, this being of the ordinary "butterfly" type. These are linked together to open and close simultaneously, being operated alternatively by a hand governor lever or foot accelerator. These two methods of actuation are arranged so that the governor lever can be used to fix the minimum throttle aperture, the accelerator being arranged to "open out" to whatever degree desired.

**Lubrication.**—The engine lubrication is arranged on the well-known pressure feed system; the oil is picked up from the base of the crank chamber by a pump, and forced under pressure into all the crank-shaft and connecting-rod bearings. The oil pump also feeds oil to the gear-box, clutch, and brake, the drainage from which is returned automatically to the crank chamber by a second pump.

**Water Circulation.**—The water circulation on the 28-h.p. cars is on the thermo-syphonic system. It is impossible

for such a system to get out of order if designed properly in the first instance. It is necessary, however, that the resistance of the pipes and radiator should be as small as possible. This is ensured by the use of the Pugh-Lanchester radiator, in which the circulation cells are entirely made of brass, and are arranged in parallel, so that the total area through which the water has to pass is of ample cross-section.

The comfort of the Lanchester car does not wholly proceed from the smoothness of the engine, the sweet running of the gears, or the silent worm drive, although these greatly contribute to the desired result. The original form of spring suspension has always been, and will always be, a feature of this car. In the Lanchester suspension the springs are of a cantilever type, and their duty is confined to the legitimate function of a spring, *i.e.* the support of the load. The location of the body with respect to the underframe is effected independently by means of parallel-motion link-work. The chassis practically rides on one long spring from end to end, and as a result the roughest of roads, the worst of paving, can be ridden over without shock. The feeling has been described as "riding on velvet."

A smaller point of advantage in the Lanchester car, but one of undeniable merit, is the success in design that renders it impossible for any driver, however careless, to cause a smoky or offensive exhaust. This fact was recently evident by the granting of the highest award by the Royal Automobile Club in trials to obtain a vapourless car. The ease of control, the efficient and excellent form of vaporiser, and the good engineering workmanship throughout in these Lanchester cars are all factors in building up the success of this interesting and popular British car.

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Mr. Lanchester is one of the most original motor engineers of our time. He was the first to make considerable use of the epicyclic system of gearing and of the worm-drive. The latter has been an unqualified success, and is likely to be largely imitated in the near future.

The Lanchester system of gearing is unique and full of cleverness. It is largely used in a simpler form upon the cheaper American cars. These Lanchester productions have possessed from the first an originality of design which has rightly given them a place of their own. Somewhat too complicated in their earlier phases for the ordinary unskilled amateur, they have been largely simplified during the last two years, and in the main have differed but little from what we may call the standard practice. As carriages they are unusually handsome, and the efficiency of the engine is beyond all question considerable.

### Mercédès Car

It would be very ridiculous, I suppose, to offer any criticism on the Mercédès Car at the end of this year 1907. Well do I remember the sensation caused by the first appearance of the Mercédès Car at Monte Carlo—was it not in the year 1902? Here was something we had never seen before—that wonderful engine, the famous honeycomb radiator, the fine, shapely frame, the gate change, the new clutch, the low-tension magneto, the pressure feeds. All that is as familiar to us as A B C now. How amazing we found it then!

And this, surely, was the beginning of a new era. Makers the world over had but one model, and that model the Mercédès. It would be idle to pretend that this is not the world's premier motor, or that its position has been seriously shaken by anything that has happened in recent years. I myself remain entirely of this opinion.

Concerning the Mercédès programme for 1908 it would appear that the firm intends to make a big effort during the coming year with their new six-cylinder car. We have seen one or two specimens of this in England during the last twelve months; but the type is one of which we know little as yet, but in which I venture to say we are greatly interested. This does not mean to imply that the Mercédès firm will pay less attention to the famous pattern of old—especially to



that wonderful 40-50-h.p. which has achieved so much during the year which is past.

The six-cylinder car is chiefly interesting, perhaps, because it is to serve for a model upon which all next year's patterns are to be built. Keeping this in mind, I cannot do better than give a detailed specification of the chassis in question as it is sent to me by the sole importers, DuCros Mercédès, Ltd., Mercédès Buildings, Long Acre, W.C.

### *Specification of Mercédès 1908 Model*

*Engine.*—60-h.p. six cylinders cast in pairs. Bore and stroke 120 × 140. Plain bearings. Four-cylinder 45-h.p. 120 × 150. Four-cylinder 60-h.p. 130 × 150, and 35-h.p. four-cylinder live-axle town carriage 110 × 140.

*Valves.*—All mechanically operated. Inlet on the right, exhaust on the left. Valve, cam-shaft, gear wheels of steel, completely enclosed and run in an oil bath.

*Ignition.*—Mercédès low-tension magneto.

*Carburettor.*—Mercédès new 1908.

*Cooling system.*—Mercédès honeycomb radiator, large gear-driven centrifugal pump. Mercédès patent vaned flywheel, drawing air through the radiator. The metal apron under the chassis is so made to permit the current of air induced by the fan to escape more freely, thus decidedly increasing the efficiency of the fan.

*Control.*—Combined throttle and accelerator and ignition lever mounted on steering-wheel.

*Lubrication.*—Mechanically operated according to revolutions of motor, giving perfect lubrication to all parts, actuated by mechanical pumps. This lubricator is simple in construction, absolutely positive in action, and will work regularly. It is reliable in all temperatures.

*Frame.*—Mercédès pressed steel. Length 240 × 2 m. 60, suitable for side entrance.

*Wheels.*—920 × 120 at back, 910 × 90 front. All wheels run on ball-bearings.

*Steering.*—Irreversible, with increased lock.

*Clutch.*—Mercédès patent metal-to-metal, with special oiling system.

*Transmission.*—Through gear-box, giving four speeds and reverse. Direct drive. All shafts revolve on ball-bearings.

*Springs.*—Exceedingly long and flexible. The springs, especially the rear ones, are so mounted as to give not only a luxurious suspension to the chassis on bad roads, but also to render the use of spring brakes and anti-shock devices quite unnecessary.

*Brakes.*—Two water-cooled band brakes on counter shaft. Internal expanding brakes on rear wheels applied by hand lever.

*Wheel base.*—10 ft. 4 in.

*Wheel gauge.*—4 ft. 10 in.

*Length overall.*—14 ft.

*Width overall.*—5 ft. 5 in.

*Weight of chassis.*—26 cwt. approximately, 24 cwt. four-cylinder model.

*Speeds.*—18, 20, 22, 24, 26-tooth sprockets can be fitted, giving maximum speeds according to seating accommodation required.

All motors will be fitted with compression-lever or exhaust-valve lifter, thus enabling even the most powerful to be started with ease.

An accelerator pedal enabling the driver while keeping both hands on the steering-wheel to vary by a simple pressure of his foot the speed of the car from eight to fifty kilometres an hour is also fitted.

This specification is subject to alteration without notice.

## The Mors

BY L. CARLE

M. Emile Mors must be regarded as a pioneer in the motor-car world, as he was the first to put a magneto on a car, as well as the first to find many practical ideas which have been adopted by other constructors. The past triumphs



The Famous Six-cylinder Hotchkiss at Newmarket.



One of the Latest 45-h.p. Mercedes





of the Mors cars are so well known that I need not recount them. The most striking, however, was the Paris-Madrid in 1903, over an average of 62·14 miles per hour, which has never been surpassed since.

Life and suppleness are certainly the first things that may be claimed for the Mors. The editor of one of the leading papers remarked lately in his columns as follows: "If I were asked what quality struck me most in the Mors, I should say life. If ever the joy of life were harboured in a piece of machinery, it is in this beautiful car."

The Mors car can be compared to a thoroughbred, and it obeys the slightest fancy of the man at the wheel. The slightest movement of the foot on the throttle pedal, or of the hand on the throttle lever fixed on the steering-wheel, which controls the same throttle as the pedal, makes the car obey so wonderfully that it seems to leap forward like a racer or slow down as gently as possible at will.

The reliability, hill-climbing capacities, and ease of control are striking features in the Mors. As for reliability, a great deal of testimony might be adduced; but it will be sufficient, perhaps, to mention only one result achieved by a 24-h.p. Mors, delivered in 1904. This car did 65,000 miles without having been overhauled, and without experiencing any trouble whatever on the road. It travelled in the Alps, Germany, France, Scotland, Ireland, and all over England.

In 1906 a French tyre company, wishing to show the reliability of their tyres, made a tour of over 20,000 kilometres as a test. As they required a car they could rely upon in every way, they chose a Mors, and not one of the 152 stages was missed; the 22,888 kilometres were covered without the least stop, as a certificate testifies, so that a Mors car can always be reckoned upon to keep an appointment to time, however far away.

Speed and silence are also two points which can be claimed for the Mors. Mr. Massac Buist, in an article in *The Morning Post* of August 20th, relating to a run on a little 15-h.p. live-axle Mors car, speaks as follows of the same:

"The first impression one had as the machine stood by the

kerbstone, with the engine running slowly and free, was of the remarkable balance achieved by four cylinders, the bonnet of the silent car being as vibrationless as that of a first-class six-cylinder type. The next was of extreme handiness, for, apart from the eminently sporting fashion in which it was possible to manœuvre the little Mors in and out of traffic, a demonstration of its possibilities in the matter of ample wheel-lock resulted in the car waltzing round and round in its own length time and again, and describing the figure '8' in a roadway of ordinary width without approaching either kerb by a margin of a yard or more."

The streets of London being up at this time of the year, Mr. Massac Buist continued :

"What trifling difficulties were occasioned in negotiating traffic served to illustrate the altogether delightful convenience of being able to 'button' the ignition by the simple pressure of the thumb or a finger on the steering-wheel, whereby the motor could be used instantly as a brake. Having wended our way under railway bridges and over tram-lines out of lesser, then larger, London, and appreciated, as opportunity offered, the brakes, special clutch flexibility, noiselessness, excellent suspension, and ease and steadiness of the steering, the machine was allowed to show its speed without check, it being possible to keep the top gear on direct drive until the engine had been pulled down to a couple of hundred revolutions or so a minute. Indeed, all the way to Bury St. Edmunds it was only needful to come twice off the top gear, traffic being the chief cause. What one could not but admire was the way a rise might succeed in slowing the motor to a third of its fastest possible rate of turning, but failed utterly to reduce its speed beyond that degree, this being demonstrated time and again during the day's run."

And it must be remembered that it was only a 15-h.p., the smallest models of Mors, of which Mr. Massac Buist was writing.

"Lively as a cricket" denotes a quality which the little Mors possesses in a prominent degree, the motor furnishing



an instant and ever-ready response to any demand put on it in the course of the day's work.

In conclusion, it remains to record a motorist's word of heartiest appreciation of the perfect conduct of the speedy little car on which the tour was undertaken, and which may unhesitatingly be pronounced M. Emile Mors's chef-d'œuvre.

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The Mors car first became known to us in England by the great series of victories won by M. Fournier. There have been progression and retrogression where Mors is concerned—the former fortunately in these later times. The Mors is undoubtedly a finely built and reliable car, representing the best in engines of French design.

M. Mors was one of the first to apply low-tension magneto ignition to his cars. This was little understood at the time, and perplexed the earlier users very much. The triumph of low-tension magneto must be very gratifying to M. Mors.

The most popular models of this car are of comparatively low horse-power, but are all quite marvels in efficiency.

## The Napier

BY S. F. EDGE

I claim nothing for the six-cylinder Napier that has not been actually proved by official certificates and tests. I do not claim that it is the "best car," as to do so would be to put it on a par with nearly every car that is made. What I have claimed for the six-cylinder Napier I have first of all proved, and I find that motorists prefer to have a copy of an official certificate from the Automobile Club in regard to any important point, than to have books full of unsubstantiated claims such as are often made by motor firms.

For those who do not clearly understand why the six-cylinder Napier has been so successful, I will try to set out shortly some of the reasons.

The principle of using six cylinders was introduced by Mr. Napier some four years ago, and owing to its continued success there are now a hundred and forty-one firms in all parts of the world who have copied Mr. Napier's principle and are starting to make six-cylinder motors. The result is that the makers have had years of experience in designing and constructing six-cylinder cars, while some other firms are now experimenting in this type of engine at the expense of their clients. The advantages of using a six-cylinder engine are very many, but some of the principal points are, that the explosions are divided up into smaller quantities than in four-cylinder cars, and before the explosion in one cylinder has done expanding the explosion in the next cylinder has started to expand, so that there is a continuous and even pressure on the crank-shaft and on all working parts of the machinery.

It is owing to this, and Mr. Napier's principle of lubrication, that the makers are enabled to give three years' guarantee with every six-cylinder Napier car. This even pressure of the working parts also greatly reduces the wear on the tyres, as instead of the wheels being jerked round by four large explosions, an even pressure is always kept on the tyres.

Owners of six-cylinder Napier cars have testified, time and time again, to the extraordinary durability of the tyres on their cars, which is the best possible proof on this point, as it can only be proved by actual experience. In addition to this great economy of tyres, the six-cylinder Napier has been proved to consume far less petrol than four-cylinder cars of equal power. For instance, in addition to winning the Albert Brown trophy with a record of 20·2 miles per gallon, and the Hertford County Club trophy with a record of 20 miles per gallon, a Royal Automobile Club's certificate was granted to a six-cylinder Napier after a run of 200 miles with four passengers, showing an average consumption of 19·96 miles per gallon.

As regards economy of lubricating oil and the efficiency of the lubricating system, the Napier Company holds a Royal

Automobile Club's certificate dated March 26th, 1907, showing that a six-cylinder Napier is capable of running 2,866 miles per gallon of lubricating oil.

With regard to gear changing, this bugbear of every driver is practically never necessary, as six-cylinder Napier cars can be run from a standstill to their highest speed on the top-direct drive, which does away with the discomfort and clashing noise of the incessant gear changing which is necessary with powerful four-cylinder cars in traffic. In proof of this a Royal Automobile Club certificate has been obtained showing that a six-cylinder Napier with four passengers ran on top gear for 1,000 miles including from London to Edinburgh and back. This car also ran at 4'4 miles per hour on the top gear without slipping the clutch and 59'2.

As regards the use of six-cylinder Napiers in towns, there can be no better proof of their suitability than the fact that one of these cars ran for six hours continuously through London traffic, and obtained a Royal Automobile Club certificate showing that the temperature of radiating water was never higher than 47 degrees below boiling point, while the petrol consumption was 1 gallon 1'84 pint per hour.

On the point of flexibility, I need hardly mention that the six-cylinder Napier has won all the first prizes in these competitions, including the Bexhill trials under the Royal Automobile Club's conditions.

With regard to reliability, it is almost unnecessary to give proofs on this point, as the reliability of the six-cylinder Napier is proverbial, but as I claim nothing without proof, I would merely quote that a lady drove a six-cylinder Napier in the Herkomer Trophy Contest over 1,239 kilometres, with a non-stop record, and at Brookland three standard 60-h.p. six-cylinder Napier cars were driven for twenty-four hours, and each of them accomplished an average of over 63 miles an hour, during the whole twenty-four hours.

Then there comes a point in which every motorist is interested, namely, hill-climbing. It is impossible to give here even a small portion of the important competitions in



which the six-cylinder Napier has made fastest time during the last few months, but among them are :

1. The Royal Automobile Club's Hill Climb, South Harting, where there were 55 competitors.
2. Essex County Hill Climb.
3. Motor-Cycling Club Hill Climb, Sharpenhoe.
4. North-Eastern A.A. Ragpath Hill Climb. Fastest time of petrol cars.
5. Wolverhampton A.C. Hill Climb.
6. Southern Motor Club Hill Climb.
7. Leicester A.C. Hill Climb.
8. Midland A.C. Club Hill Climb.
9. North-East Lancs. A.C. Hill Climb.
10. Coventry Motor Club Hill Climb.
11. Yorkshire A.C. Hill Climb.
12. Sussex A.C. Hill Climb, South Harting.
13. Manchester Motor Club Hill Climb.
14. North Herts A.C. Hill Climb.

In fact, the six-cylinder Napier is now generally admitted to be invincible as regards the important point of hill climbing.

Lastly, I would like to point out that the six-cylinder Napier is the only car which has successfully represented Great Britain in the principal International events and that it can more than hold its own with cars of every other nation, as it at present holds the following nine world's and international records—which is more than are held by all the foreign motor-cars put together :

50 miles in 42 minutes  $46\frac{2}{3}$  seconds. World's record made at Brooklands.

1,000 miles in 14 hours 54 minutes  $15\frac{2}{3}$  seconds. World's record made at Brooklands.

799 miles 1,600 yards in 12 hours. World's record made at Brooklands.

1,581 miles 1,310 yards in 24 hours. World's record made at Brooklands.

The 1 Kilometre (standing start) in  $27\frac{2}{3}$  seconds. World's record made at Ormond Beach.

The 1 mile (flying start) in  $37\frac{2}{5}$  seconds. European record made at Blackpool.

The 1 mile (standing start) in  $37\frac{2}{5}$  seconds. World's record made at Ormond Beach.

The 10 mile (standing start) in 6 minutes 15 seconds. World's record made at Ormond Beach.

The 100 miles (standing start) in 1 hour 15 minutes  $40\frac{2}{5}$  seconds. World's record made at Ormond Beach.

\* \* \* \* \*

I shall add very little to Mr. Edge's claims for his car. The Napier justly stands at the head of all British productions, and the British industry owes more to Mr. Edge than it can ever repay. The superb finish and no less superb performances of the Napier car are uncontestable. No one, I think, is readier to admit this than the unconverted advocates of the four-cylinder machine.

## The Panhard

BY HARVEY DU CROS

The chief feature of the Panhard car is, perhaps, its simplicity. I do not think any one denies that this car is, and always has been, the simplest in automobile production. It is also an undoubted fact that no one denies that Panhards are remarkable for their durability. The original cars made by Messrs. Panhard & Levassor are frequently seen on the road even to-day. At the same time that simplicity in construction is aimed at, no pains are spared to make the cars equal to any others in excellence of material employed and perfection of finish. This is only to be expected when one remembers that Messrs. Panhard & Levassor are the pioneers of the motoring industry. In recognition of this fact, by the way, a monument is at the present moment in course of erection in Paris in memory of M. Levassor.

For the 1908 season the Panhard & Levassor Company will build 10-, 15-, 18-, 24-, 35-, and 50-h.p. cars, the 10- and

15-h.p.'s being of a different model to the other types. The 18-, 24-, 35-, and 50-h.p.'s will have four-cylinder (separated) engines. The crank-shaft is supported by five bearings fitted with caps, which allow the bottom half of the crank-case to be removed without disturbing the crank-shaft or bearings.

Ignition will be by means of magneto and sparking-plugs, with accumulators in combination with the magneto in case of emergency. This magneto is placed under the bonnet of the engine, and is fitted to the same shaft as the water-circulation pump. The advancing and retarding of ignition is effected by the displacing of the induction magnets round the axle of the magneto. Other features will be the automatic carburettor and hydraulic regulator.

Water circulation is to be effected by centrifugal pump, worked by gears; this pump revolves at the speed of the engine, and consequently at the same speed as the magneto, which admits of fitting these two devices to the same shaft.

The water distribution in these new types is done in series. The water passes first round the fourth cylinder, and successively round the others; it then passes into the radiator. This arrangement admits of reducing to the smallest number the water circulation pipes, although ensuring at the same time perfect cooling.

Starting from 24-h.p.'s, the engines have a system of decompression which facilitates the starting, only retaining such compression as is necessary for ignition.

The lubrication is of an entirely new type, and differs from the lubricators actually in use on the majority of cars. These latter have an output which is proportionate to the rotative speed of the engine, and not proportionate to the power which it develops. From this arise several drawbacks. In particular, at times when the engine has not to supply any power, and therefore does not need much lubrication. When disengaging the gear, for instance, the oil runs to excess, smoke is formed, and oil is wasted.

On the other hand, when a great effort is required of the engine, and when it slows up (for instance, while climbing a rather stiff incline on fourth speed), and it should be well



lubricated, whereas by the system usually adopted the working parts are not sufficiently oiled.

Messrs. Panhard & Levassor have sought to remedy these drawbacks, and have tried to get a lubricator whose output of oil will be proportionate to the power required of the engine, and not to its rotative speed. The 1908 cars will be fitted with a device which realises these conditions, and in which the output is regulated by means of the depression produced by the intake of the engine, which is proportionate to its power.

A metallic clutch will be used with discs of the usual pattern. Change-speed will be effected by means of a complete set of four-speed gear wheels, with direct drive on fourth speed with chain-transmission.

Brakes.—Apart from differential brakes and side-wheel brakes fitted on all cars, Panhards have added a third brake obtained by the engine. It consists in modifying the lift of the exhaust valves in such a way as to obtain resisting efforts during the time of intake, compression, and expansion. This device is realised by means of extra cams which act on the valves by means of a longitudinal displacement of the camshaft. This is operated by means of a pedal within the driver's reach.

This brake, which can be thoroughly depended upon, and the working of which requires no effort on the part of the driver, is particularly adapted to long, downward slopes and hilly districts. It prevents overheating, which always arises on differential brakes or on wheel brakes when they are used for any length of time, and impedes their working. Besides, there is no wear on any parts, as the engine works, when acting as brake, as well as when it is acting as an engine.

10- and 15-h.p. Cars.—The engine in these cars will be of the same type as that of the other patterns. The gear is fitted with metallic clutch and change-speed with double set of gear wheels. The drive on these two sets of gear wheels and on the reverse is effected by means of a lever which displaces itself on a single sector—all system of bolting thus becoming unnecessary. Transmission is effected by means of flexible

coupling with special device allowing of obliquity of the arms of the rear axles. This method of transmission has the advantage over chains of being easy and inexpensive in up-keep ; in addition, it admits of a wide side entrance on short chassis and ensures a minimum of noise.

The drawback of the systems used on the majority of cars is that obliquity of the arms of the rear axles is impossible. Messrs. Panhard & Levassor have solved the problem, and their 10- and 15-h.p. cars, though particularly adapted to town use, will have nothing to fear from hard wear, bending of rear axle, or great wear of parts which would otherwise immediately ensue.

The various types of car can be fitted, if required by clients, with an automatic starting device (Saurer patent). This works by means of a pump which is driven by the engine, and which compresses the air in a tank, whence it is distributed on to the cylinder which is in expansion. It is very easily put into use by simply opening a tap. The air-tank can also be utilised for inflating tyres.

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It does not seem so very long ago that the *marque* Panhard & Levassor had no rival in the motoring world. The late Monsieur Levassor built the first four-cylinder car that ever ran upon the road, and gave us at a *coup* the outline of the chassis as we have it even to this day.

The old Panhards were without rival in their day. They first taught us the meaning of the word "reliability" as applied to a petrol engine. There are those who think that the great firm of Panhard & Levassor have been slow to imitate modern practice, and that their later cars are not as fast as they might be or as light. My own faith in Panhard & Levassor remains unshaken. Those who know nothing about motors, who will keep but one car, and who expect it to last them for many years, may well look with confidence to this famous house. As Mr. Du Cros points out, Panhards are now to be thoroughly modernised, and this cannot fail to maintain their deservedly great reputation.





*Photo by H. Jenkins, Lowestoft.*

The Six-cylinder Brooke Car



The Six-cylinder Darracq Car.





## The Peugeot

Twenty-three years ago, Messrs. Peugeot Brothers were noted for their inventive and mechanical genius in connection with methods of propulsion. At the great Paris Exhibition in 1889, a large two-seated motor-tricycle was exhibited, and this must be taken as the genesis of the internal combustion motor as applied to road vehicles.

In 1891 a car, manufactured by Messrs. Peugeot Brothers, followed the cycle races of Paris-Brest from the manufacturing town of Valentigney to Brest and back to Paris, a distance of nearly 1,650 kilometres, and, during subsequent years, the great races from Paris-Rouen, and Paris-Brest, were experimented with and followed by Peugeot motors, from the view-points of experience, exhaustive trials, and general interest.

In the year 1896, which was contemporaneous with the road traffic revolution in the British motor world, the inventor, Mr. Armand Peugeot, floated an independent enterprise. Since this, continuous and extensive additions to factories and working capital have been made.

It must be admitted that, at the present day, the Peugeot Motor Company are in the first rank for touring cars. Past records and figures can be brought to demonstrate the speed, solidity, and comfort with which this firm's automobiles are associated. They have carried off victories innumerable, and consistency is proved by the fact that in a similar class for two successive years Peugeot motors of 12 to 16 h.p. showed indisputable superiority and steady progress by winning each event.

There has been no possible form of motor-chassis with which the Peugeot Company have not completely experimented in its due time and proper place, and brought up to the pinnacle of prevailing progress. In this we refer at the moment more particularly to such forms of commercial vehicles as delivery vans, omnibuses, etc. As an example of success in this particular line, we can point out that the Peugeot was classed first with a maximum number of points

in the military competition for vehicles of heavy weight from Paris-Marseilles-Paris, organised by the Automobile Club of France, in December 1906.

The Peugeot is the French car that still maintains its excellence, and is the only firm of long-standing repute still manufacturing two-cylinder engined cars and with a range of models from 8 h.p. to 50 h.p.

The laboratory which is used for the trial and verification of all the material entering into the construction of the Peugeot cars ensures an indisputable guarantee of irreproachable character. The testing of all metals and their qualities calls for and receives the utmost care and scrutiny. Testing is done before the article is manufactured into the various component parts, and after their complete assembly into the finished stage.

In addition to the internal combustion engine fitted to the Peugeot, some of the most special features of the cars are the Touffault shock-reducers, low-tension magneto ignition, gate change-speed, ball-bearing shafts and gear-box, and dust-proof steering pivots.

With the above points before one it is made apparent that the Peugeot cars are fully worthy of the high place they have taken in the motor world. Soundness of workmanship and the utmost reliability are guarantees which the makers confidently put forward, and the great popularity the cars have achieved is sure evidence of their merits.

## The Renault

All that skilled workmanship and care can effect go to the making of a Renault car. The materials employed in the construction of the chassis and other parts are of the finest quality and nothing is used that has not been first subjected to a satisfactory test. Motors, change-speed gears, carburettors, axles, etc., all are verified and proved one by one before being mounted on the chassis, the relation of one part to the other being considered in every respect. The result of further particular care in the trials of the chassis themselves on the



roads, under conditions of weight and actual resistance, is to secure the maximum result, coupled with the elasticity and silence for which our cars are so justly famed.

But it is best, perhaps, to let the cars speak for themselves. When the special features are mentioned which are the characteristics of the Renault, the intelligent motorist will see at a glance what are the points in its favour when compared with other cars on the market.

The motor of our 35 to 45-h.p. chassis, which is of the vertical type and four-cylindered, has no governor. We have done away with this part, as it had become useless owing to our adoption of a special arrangement of inlet throttle to the motor. Normally, and for starting, the admission is only slightly opened to the motor, but an accelerator pedal is fitted to allow the driver to attain the maximum acceleration of the car.

One of the greatest troubles that a motorist has to endure is the dust nuisance. In cars of the lower grade this causes endless bother and work, and in the cleaning that is so frequently entailed there is the risk of injury to one's fingers while handling the exposed gears. In the Renault cars this difficulty is obviated. All the parts of the motor, distribution gears, cam-shaft, crank-shaft, etc., are completely enclosed in the crank-chamber itself, thus receiving the necessary projections of oil for lubrication, and also ensuring complete protection from dust. No accident can arise from foreign bodies, such as stones, spanners, or rags which might get entangled were the pinions not so encased.

The motor possessing all its valves on the same side, contrary to what might be supposed, is more supple, and a better working of the motor is obtained than by having the valves placed on either side of the cylinders. It is necessary to add that in the makers' opinion this arrangement has in addition the simplification of the parts and much greater accessibility. The 35-45-h.p. motor has the cylinders cast in pairs instead of separately. The latter arrangement necessitates undue length in the dimensions of the car, besides rendering its appearance much heavier. The friction on the

crank-shaft is more considerable and the water circulation more complicated. Some say, in favour of the separate cylinders, that there is economy in case of replacement, but this difficulty is practically illusionary if it is borne in mind that the breakage or wear produced in one is generally to be found in all four cylinders.

There is a special patented arrangement of lubrication assuring a continuous flow of oil to all the bearings. This arrangement has been adopted on the 35-h.p. as well as on all the other models. The oil is drawn by the rotation of the connecting rods into channels placed in the upper part of the crank-chamber, it then passes through little troughs placed above each bearing, by means of which they assure the lubrication. From there it flows into circular rings, whence it is ejected by the centrifugal force towards the connecting rod bearings, through little channels pierced in the crank-shaft.

In order to prevent the oil flowing to the back or front of the motor on gradients, a special arrangement has been adopted by which the lower part of the crank-chamber is transversely partitioned. By this means the oil is held underneath each bearing, assuring an equal quantity of oil to each of the four cylinders.

Ignition in the 35- to 45-h.p. motor is effected by means of a high-tension Simms-Bosch magneto to sparking-plugs. All low-tension wires are enclosed in insulated material and protected from the damp. A patented arrangement for attaching the wires to the plugs, which ensures one being able to instantly verify each cylinder without being obliged to stop the engine, is to be found in all Renault cars. These ebonite discs have also the advantage of allowing one to change the plugs very quickly. Thanks to the absolute reliability of this high-tension magneto, it is quite unnecessary to fit a supplementary ignition.

With regard to the change-speed gear, this allows four different speeds and a reverse, all being worked by a single lever on the right of the driver. The great feature of our patented change-gear speed has always been a direct drive on the top-speed, the transmitting shaft being coupled up by means of

dog clutches. This arrangement was adopted by M. Renault in the construction of the first of his cars, and recognised universally since as the best and only capable way of assuring the maximum efficiency of cars. In addition, this patented arrangement renders the car very gentle and silent, and reduces friction to a minimum.

The above are only some of the distinctive features of the Renault. They are sufficient, however, to make it apparent that the Renault has much originality in its design and that it is thoroughly up-to-date in all the requirements that are demanded of a high-class 1908 automobile.

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I have said elsewhere in this book that I consider the 20-30-h.p. Renault, as made in the early part of the year 1907, to be the finest car for its horse-power yet known. The many beautiful qualities of the Renault engine are justly appraised alike by the expert and the amateur.

The Renault is not a speedy car, but as a town carriage or as a touring car for those who would know the whole luxury of travel it has few equals.

## The Rochet-Schneider

BY THE LONDON REPRESENTATIVE

The Rochet-Schneider is essentially a powerful and notoriously reliable touring car with a great reputation behind it. The chassis of this car, the frames of which are constructed of pressed steel, are built entirely to the tourist's point of view. Great attention has been paid to the suspension, and by the adoption of a system of three springs at the rear all unpleasant road shocks and excessive vibration have been eliminated. As a touring car and a good hill-climber the Rochet-Schneider has many points in its favour which will commend it to the motorist.

Hitherto all the engines in the Rochet-Schneider cars have been of the four-cylinder vertical type, situated in the front



of the chassis. In the new 1908 models the 30-h.p. and 45-h.p. cars will be six-cylinders, the ignition in each being low-tension magneto. The cylinders in all types are cast in pairs, and with their water jackets form one casting. All the valves are mechanically operated and are interchangeable. Starting is very easily accomplished, as the engines used in cars above 20-h.p. are fitted with an independent half-compression device which absolutely prevents back fires.

Magneto ignition is fitted to all the engines. In the 16-18-h.p. model Simms-Bosch high-tension is used, while in all the other types low-tension with "make-and-break" tappets is fitted. The ignition tappets are fitted with mica insulators, detachable so as to permit of their cleaning without interfering with the timing. The points of contact are protected from oil.

The car is controlled by means of two levers placed above the steering-wheel, one operating the throttle and the other the ignition. To facilitate the location of irregular firing, each cylinder can be cut out separately, and, to minimise noise, the gear wheels actuating the cam-shaft, magneto, and pump are all enclosed in the same casting as the crank-chamber, and run in oil. The gear wheels are manufactured of fibre, and the pinion of tempered steel, and the size of the teeth is such that wear is reduced to a minimum and their working is absolutely silent.

The engine takes its supply of gas from the new patent Rochet-Schneider Carburettor ("brèveté S.G.D.G."), which automatically regulates carburation at all fluctuations of engine speeds, and at the same time greatly reduces the consumption of petrol. The engine is cooled by water circulation, operated by a gear-driven pump of great power, and the water is forced through a radiator having a very large cooling surface, which is assisted by a ventilating fan placed immediately behind the radiator.

The lubrication of the cylinders is effected by means of a gear-driven pump which supplies a drip-feed rack on dashboard. The supply of oil is proportionate to the speed of the engine, and can be regulated as desired. The engine

and all other working parts are protected from mud and dust by an efficient steel casing, and the design of the bonnet permits of thorough inspection to all parts of the engine.

The change-speed gear is the same as that fitted to the 1906 cars, the design of which is patented. The two gear shafts are on the same plane, and, to avoid torsion on the chain sprockets, the two halves of the differential shaft are the same length. All our cars are fitted with direct drive on top speed. The gear-box is of small dimensions. It is fitted with two change-speed arms operated by a single lever, working in two separate sectors (gate system) giving four speeds forward and one reverse, except in the case of the 16-h.p. model. The transmission is by means of strengthened Reynolds roller-chains, and the sprockets are easily detached.

In addition to other features we may note that the oil tank fitted to all the chassis is placed under the bonnet, and serves to feed the pump which distributes the drip feed. All the chassis, except the 16-h.p. model, are delivered fitted with a pressure-feed petrol tank. The petrol runs through a very fine filter on its way to the carburettor. Pressure is first obtained in the petrol tank by means of a small hand-pump placed under the footboard. The handle of the pump is accessible on the left-hand side of the chassis. Pressure is maintained by a branch exhaust pipe fitted with pressure valve and gauge. The clock gauge is fitted on the dashboard, and indicates the exact amount of pressure.

Except in the 16-h.p. model the governor is extremely sensitive, and is on entirely new lines. It is placed outside the distribution wheels and encased in an aluminium box. In the 16-h.p. model, a special patented arrangement allows the abolishment of the governor, and the speed of the engine is automatically controlled by the clutch-pedal. This type of chassis has been specially designed for town work, as this arrangement permits of easy control and is extremely silent.

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This is a great car. It has always been remarkably fast and exceedingly durable. I wonder that it has not more

friends in England ; but those it possesses are both staunch and eloquent.

There are few original features upon the Rochet-Schneider, which was once called the French Mercédès. But its general design is most workmanlike, while for flexibility and power the engine may be compared to the best.

### The Rolls-Royce Car

This car is the outcome of the combination of practical motorists' long experience, and the design of an engineer of excellent repute.

In 1904 Mr. F. H. Royce, the well-known designer of electric motors and cranes, having had the advantage of consulting the Hon. C. S. Rolls (one of the earliest motorists in this country and a well-known racing driver) and Mr. Claude Johnson (the first secretary of the Royal Automobile Club, and one who had had exceptional experience with every make of car), produced a two-cylinder car, which was known as the Rolls-Royce, and this was exhibited at the Paris Exhibition in December of the same year, side by side with a four-cylinder car which had not yet run on the road, and a six-cylinder motor.

In 1905 a four-cylinder Rolls-Royce car, driven by Mr. Percy Northey, took second place in the race for the Tourists' Trophy, and on this occasion the committee of the Royal Automobile Club were making use of a six-cylinder Rolls-Royce car as one of the Club's official cars.

In 1906 Mr. Rolls won the Tourists' Trophy on a four-cylinder Rolls-Royce car, making the extraordinary average of nearly forty miles per hour on a petrol consumption of a gallon for every twenty-five miles.

In 1907 a six-cylinder 40-50-h.p. car was submitted to a series of tests under the Royal Automobile Club, with the following, among other, results :

It carried four passengers up Netherhall Gardens, which has a gradient of 1 in 7·2, on the second gear, and on the





Chassis of the Six-cylinder 40 50-h.p. Rolls-Royce.



The Engine of the Six-cylinder Rolls-Royce.



same gear attained a speed of over 42 miles per hour on the flat. It carried four passengers up the Test hill in Richmond Park, which at one point has a gradient of 1 in 7·8 on the third gear (which is the direct drive); and on the same gear, on the flat, attained a speed close on 53 miles per hour; while on this same gear, without clutch manipulation or touching the pedals, the car was driven at 3·4 miles per hour. As a further test of the elasticity of the engine, the car was driven, without using any gear lower than the third, which is designed to give a speed of 37 miles per hour at one thousand revolutions of the engine, from Old Bexhill Post Office, *via* Handcross Hill, through London, and by the north road to Edinburgh and Glasgow. On this occasion the petrol consumption of the car was tested by the Club, and in order that there might be no question raised, an ordinary two-gallon petrol tin was used as a petrol tank, and every time it was emptied it was refilled from sealed standard two-gallon cans.

The distance of 417 miles from Hatfield to Glasgow was covered with a fuel consumption of 20·8 miles per gallon. It may be added that on the arrival of the car in Glasgow it proceeded round the course selected for the Scottish Trial, and then returned to London, a distance of 2,000 miles, with one stop for lack of pressure in the fuel tank, and thirty seconds for the adjustment of the coil.

Not content with this display of the car's qualities, the Rolls-Royce Company entered the car to run a 15,000 miles' trial under the observation of the Royal Automobile Club, which also included participation in the Scottish Automobile Club's trial of 740 miles of mountainous roads.

During the Scottish Trial the car had a stop of one minute, owing to the petrol tap having turned off; but owing to its performance in the hill-climbing, and its record petrol consumption (17·02 miles to the gallon), easily secured the gold medal in competition with such well-known cars as the Mercédès, Berliet, Darracq, Ariel, and the Hotchkiss.

At the close of the Scottish Trial the car commenced to run



over a route of 500 miles between Glasgow and London, passing through Edinburgh, Newcastle-on-Tyne, Leeds, Bradford, Huddersfield, Manchester, and Coventry, and backwards and forwards over this road day and night, only stopping on Sundays. There were four drivers and four official observers of the Royal Automobile Club engaged in this trial. The mileage mounted up very rapidly, since a distance of about 2,400 miles was covered every week. The former record for the longest run in which no involuntary stop had taken place was held by the Siddeley car, with a total of 7,089 miles, but this record was quickly passed by the Rolls-Royce car.

During the trial the committee of the Royal Automobile Club passed a resolution that no car should be observed by the Club in any long-distance trial for more than 15,000 miles, and at the end of that distance the Rolls-Royce car had covered 14,371 non-stop since the petrol tap turned off during the Scottish Automobile Club's trial. The Rolls-Royce Company, prior to the trial, had had the courage to ask the Royal Automobile Club to strip the car at the conclusion of the trial, examine every part of it, and to direct what parts in their opinion required renewing in order to make the car as good as new. The examination by the expert committee revealed an extraordinary state of affairs.

The engine was passed as perfect; the transmission throughout was passed as perfect; one or two parts of the steering details showed very slight wear, perhaps one-thousandth part of an inch, and the committee condemned these as not being "as good as new"; they also required the small universal joints in the magneto drive to be replaced, and the water-pump to be repacked; and this was all that was required for making the car equal to new after a mileage which many cars do not cover in three years' work.

The Royal Automobile Club are about to publish a certificate stating the cost of running a six-cylinder Rolls-Royce car, and the cost of putting it into repair after its long run. This certificate will be the first official statement as to the cost of running and maintaining a powerful motor-car and, therefore, should be of great interest to motor owners, and a



*Photo by Wakefield, Brentford.*

45 h.p. Six-cylinder Siddeley : The Queen's Carriage.





standard by which they can judge whether their cars are costing them too much or not.

Owners of cars have been unanimous in their congratulations to Mr. Royce on the condition of the working parts of the car at the end of the trial, and many have gone so far as to state that had they not seen the condition they would not have believed it could have been possible.

Since the Rolls-Royce Company are at present manufacturing only the six-cylinder 40-50-h.p. car, it is not necessary for the purposes of this book to describe the two-, three-, four-, and eight-cylinder cars which Mr. Royce has produced in the course of two years. The six-cylinder Rolls-Royce is unique in three particulars:

(1) Mr. Royce is of opinion that a six-cylinder engine should be treated as two engines of three cylinders each, rather than considering them, as is usually done, as three engines of two cylinders each. He maintains that the "couple" occurs between the two sets of three cylinders and at the two ends of the crank-shaft, and it is at these three points that specially large bearings should be provided. The Rolls-Royce crank-shaft, in addition to these three bearings, have four intermediate bearings.

(2) Mr. Royce is of the opinion that under certain road conditions the forward end of the frame might have a tendency to "whip," or bend slightly out of line, and that if the six-cylinder engine with its long crank-case were fixed rigidly to the frame, considerable strain might be put on the crank-case. He has ingeniously met this possibility by providing a three-point suspension, so that the forward end of the engine is quite unaffected by the position of the side members of the frame.

(3) The last point is that the radiator for a similar reason is insulated. It can move backwards, forwards, or sideways, and is not rigidly attached to any part of the chassis, and therefore is not subject to the shocks which often cause leakage and breakage.

The engine is fitted with two complete systems of ignition, high-tension magneto and high-tension accumulator. In

the distributor of the ignition, the current is not dealt with by means of a brush working on a circular disc, having metal and vulcanite faces alternately, as it is impossible to get true synchronism by this method, but in the Rolls-Royce distributor a cam is made to move a little lever, the break taking place between platinum points.

The lubrication of the engine is through the centre of the crank-shaft, the oil being conveyed under pressure to the inside of each bearing, and up the connecting rod, through the gudgeon pins to the cylinder walls. That there was no appreciable wear in any part of the engine after, perhaps, 30,000,000 revolutions which the engine made during the 15,000 miles' trial is sufficient indication of the excellence of this system.

A cone clutch lined with leather is employed, which practically runs in oil, and is therefore very sweet in its action. The gear-box has four forward speeds and one reverse, the third speed being the direct drive. The reason for this is that it is found that the third gear is the one which is in use more than any other, and it is desirable that the gear which is most in use should be the direct drive. The fourth gear is used for really fast road work.

The back axle is of the double type, recommended by the judges of the Royal Automobile Club, the drive being fitted through a large bevel.

The steering is so arranged as to provide a very large lock, and the utility of this was shown by the fact that in the Scottish Trial, on the well-known corner of "Rest and be thankful," the Rolls-Royce car, having a wheel base of 11 ft. 3 in., was able to take this corner in its stride, while many four-cylinder cars, having far shorter wheel bases, had to stop and reverse before they could get round this acute angle.

The makers of this car pride themselves on its ease of suspension. The springs are made of a large number of thin plates, instead of following the usual practice of a small number of thick plates.

The engine is remarkably silent, and the absence of

vibration has been demonstrated by taking a glass filled full to the brim with water, placing it on the bonnet of the car, and then racing the engine up to 1,600 revolutions per minute without spilling a drop. The chassis price of this superb car is £895.

## The Spyker Car

Concerning this famous car, Mr. Frank Wellington writes to me: "As you are yourself a driver of Spyker cars, I should much prefer your own testimony concerning them; but since you ask me to describe the technicalities of our 1908 models, I must endeavour to do so." To which he adds the following schedule of details:

The chassis is pressed out of cold steel plates by powerful hydraulic presses, the side members being composed of one complete sheet, thus giving a strength and rigidity above the ordinary. Moreover, the chassis is also fortified with ash in the older fashion, but one which ensures a frame of the highest durability.

We make a great point of our radiators. They never give trouble. They are built under Herr Spyker's own patents, and consist of square copper tubes, through which is inserted a copper wire twisted like a screw to assist in breaking up the air as it passes the square holes. This radiator is mounted on a ball, and thus has sufficient play to forbid the consequences of vibration.

Our lubrication is noteworthy. We carry a positive oil pump in the reservoir at the lowest part of the crank-case, and this pumps oil to the walls of the cylinders and also sprays it over the main bearings of the engine. This means that we use but half a pint of oil for every hundred miles' run, instead of the four pints under the older system. I should add that we now run the engine upon ball-bearings throughout—being one of the few firms to do so—and that we are faithful to the old-fashioned leather clutch, which, when properly fitted, we believe has no rival. All Spyker models



will run nearly everywhere upon top gear, thus avoiding the necessity for more than three speeds. Our brakes are exceedingly powerful, and the foot-brake, controlled by a right- and left-hand thread, and capable of instantaneous adjustment, is one of the best ever fitted to any chassis. We have long been famous for the fine work put into our rear axles, and the wearing qualities of these is, I think, justly admired. These cars are constructed throughout from solid steel, and hardly a casting is used. The boat-like shape of the chassis makes the car dustless—a claim made for it with confidence and supported by all who use it. Our latest 30-40-h.p. model has won many new friends, even for the Spyker.

\* \* \* \* \*

As Mr. Wellington says, I drive a Spyker, and know much of these cars. The material in them is of the highest quality. They have lived down all mistakes, and are the work of one of the cleverest motor engineers in Europe. Herr Spyker built coaches long before he built motor-cars. It is needless to say, therefore, that the comfort of his "bodies" is above all question remarkable. They are sweet-running carriages all of them, wonderfully durable and pleasing in appearance, and the finish of the coachwork could not be surpassed.

The price of the 40-h.p. model is £750.

## The Weigel Cars

BY D. M. WEIGEL

An intending purchaser having his first trip on a Weigel car is usually struck by the fact that the car gets away from the mark very quickly; that the engine is wonderfully responsive to the slightest touch of the accelerator pedal; that the car will persist upon its top speed up very severe gradients, the engine turning at comparatively few revolutions per minute; and that in a word the car is full of that mysterious quality known as "life." Probably, therefore, the most important feature noticeable so far as the running of the car is concerned is its extraordinary vitality.

This feature is the result of clever engine design, together with a very perfect form of transmission. Although it is a scientific fact that with any of the present-known forms of transmission on a motor-car there is a heavy loss of power between the engine and the road wheels, nevertheless much may be done to minimise that loss by the employment of ball-bearings in the gear-box, ball-bearings in the bevel drive, and ball-bearings in the road wheels.

But in order to have a free-running chassis it is necessary that the engine shall be what is known as a "lively" engine. In the design of the Weigel engine there are several points to be noticed not found on other engines. The chief of these is the absence of a lengthy induction tube. In the Weigel engine a gas pocket is clamped between the cylinder castings (the cylinders are cast in pairs), and immediately under this is the carburettor. Adherents to that form of design which is characterised by a lengthy induction-tube have claimed that their design is economical, and that the Weigel particular system, on account of the fact that the carburettor jet is so near the inlet valves, is uneconomical, but their arguments meet with refutation from the experience of those users of the car who get, as a rule, about seventeen or eighteen miles on one gallon of petrol with a heavy 40-h.p. touring body and a full load.

One driver of a Weigel, who has made an amateur study of carburation, has got no less than  $21\frac{2}{3}$  miles to a gallon on a car which won first prize at an important hill-climb. This consumption on a 40-h.p. is really striking, and it proves that a high petrol consumption, such as one finds on several important English cars, is not necessarily an indication of power.

The low-tension form of magneto ignition is used on this car, because it is believed to be the best, for the reason that in the low-tension form of ignition, as opposed to either a high-tension magneto or high-tension accumulator ignition, there is a positive flame, which secures very rapid combustion instead of an infinitesimal spark jumping across two points.

A large petrol tank is employed, which is carried behind

the back axle, the petrol being fed to the carburettor by means of pressure supplied from the exhaust pipe. With this system there is never any fear of stopping on a hill through the fuel not feeding to the carburettor, as is occasionally the case with a gravity-fed fuel. A large tank is used, because with a 40-h.p. car large distances are very frequently travelled, and the makers believe in securing for their customers the minimum of trouble, so that a man may start from London and get to Newcastle without the necessity of buying petrol *en route*.

Another special feature of the Weigel car is the lubrication system. This is of the variety usually known as the dredger type, and consists of a series of small oil buckets, which are driven at a rate of speed dependent on that of the engine, emptying themselves in the scoops fastened to pipes leading to those portions of the mechanism of the chassis which require the greatest amount of oil. The lubricator is fitted with a glass top, and is fastened to the centre of the dashboard, so that the driver can see that the lubrication system is in order. This glass top is occasionally very useful in traffic on account of the fact that even a good driver on a Weigel car is occasionally puzzled to know whether his engine is running or not when the car is at rest. A glance at the lubricator shows if this is working, and settles the question for him.

The control of the Weigel car is extremely simple and very comfortable, not the least important feature being that the steering-wheel is of large diameter. There are three large pedals and a small button pedal; the larger pedals have been made particularly large, so that the whole of the sole of the driver's foot can rest on the pedal, and give him that leverage which is the essence of safety.

The clutch is of the multiple disc variety, and very easily operated; it is coupled to the pedal on the extreme left, which has a flange on the left-hand side, in order to prevent the driver's foot from slipping off. The other two pedals are brakes, and the small button pedal is the accelerator pedal. The consequence is that in ordinary touring the control of



the Weigel car is confined, apart from the steering, to pressure of the right foot on the accelerator pedal, which opens when pushed downward, or, being released, closes the throttle, thus varying the engine speed at the will of the driver.

The live axle form of transmission has been chosen because it has been proved, time after time, that this is the most efficient, and, at the same time, the most economical. It certainly gives the sweetest running. With this type one obtains immunity from the rattle of noisy chains and the inevitable adjustment upon their wear. The day of the chain-driven car is over ; its knell is rung, and in a few years' time, it is safe to say, the only vehicles with chains will be the motor-omnibuses, if indeed they are not by that time as extinct as the "boneshaker" or the hobby-horse. Sooner or later the chain-drive will take its place amongst the almost forgotten antiquities, such as tube-burners and belt-driven motors.

There are four changes of speed in the gear-box, which are accomplished by what is usually known as the "gate-change." As a rule, the car may be driven even in the thickest traffic upon the fourth speed, which is a direct drive, one change to third when the vehicle is almost stopped, and the ordinary driver may start upon the second with ease and certainty. The first speed is very rarely used ; it has been known to be employed by members of the Weigel Company in giving demonstrations of climbing "trick" hills with twelve or fourteen people all crowded into one car.

The 40-h.p. Weigel car will attain a speed greater than that of the winner's average in any Gordon-Bennett race, and will get up Handcross Hill on top speed with a full load of five people.

Having said so much on design and control, a word or two remains to be said as to the material in the Weigel cars, for the workmanship speaks for itself. Except for the magneto, the whole chassis is made of English material. Sheffield has yielded up the best of its steel, the Midlands have given their finest bronzes, English oak and ash are employed in the construction of the wheels, and from the Black Country comes

all that is essential in iron. Huge dies have been made for those parts that are pressed and stamped from the solid, such as the front axle, which is made of nickel steel. Metallurgical chemists have given the fruits of their knowledge in the composition of the more precious combinations of the baser metals, such as the malleable iron castings and the vanadium steel crank-shaft.

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The Weigel is a car upon which I have been able to bestow the highest praise in the public press. I can only add that Mr. Weigel's claims for his achievements do not appear to be in any way exaggerated.

The price of the Weigel chassis is £550 for the new 25-h.p. model and £750 for the 40-h.p. The firm is putting a six-cylinder car upon the market for 1908.

## The White

BY FREDERIC COLEMAN

To reply to the point-blank query, "What do I claim for the White car?" would be to answer a question which is, of course, frequently put to me in the course of the daily routine of the motor business. To my mind actual claim for a car on any particular point should never be made unless there is some specific official record of indisputable public performance or some generally and universally recognised feature to back up the claim. So far do I go in this belief that rather than make a claim along any particular line and support it by a reference to the official proof of my contention I have learned to save time in business, and merely give the proof without the preliminary introduction of the statement of claim.

As the above question asks my claims, however, I will endeavour to put a few forward in as brief a manner as is consistent with surety that my points are thoroughly understood.

The White Company manufactures a good motor-car which is sold at a reasonable price, comparing well with the price of other vehicles of like size and power. Its cars are made of the best material, and with the best workmanship that can be procured, are tested with the utmost care, and the Company's officials are given a free hand in dealing with the purchaser of a motor-car after he has once paid his money and become the possessor of the vehicle.

The car runs smoothly and quietly, with great flexibility, is economical as regards the actual amount of money which need be spent upon it in the course of the years of its running, and is easy to handle and keep in order. Personally, I have sufficient confidence in the car as regards the excellence of its material and the character of the workmanship employed upon it to give a three years' guarantee with every car I sell. The comfort of the car is one of its strong points, and the winning of the gold medal in last year's Town Carriage Competition, which was very much on the lines of a "luxury contest," has amply demonstrated that any claim we may make for the delightful running of the White Car has been well borne out when its qualities in that connection have been put to the test in competition with the best motor-cars of to-day. Without being speed monsters the White Cars are powerful.

Nowadays motorists are getting to be comparatively well acquainted with the appearance of the White Car and have an opportunity to judge for themselves its speed on the road and its particularly noticeable speed up hills.

The reliability of the White Car has been pretty well recognised and the car has shown up well with possibly one exception in every reliability trial in which it has been entered for the last six years. The immediate success of a similar type of car in a very much severer reliability trial both preceded and followed the only instance in which the public performance on the White Car was disappointing; but whether good fortune or bad fortune may attend the White Car in reliability trials—and certainly it has had its share of good fortune in the past six years—the real record of reliability



is what the car will do in the hands of the individual owner as it performs its daily work.

As is well known, there have been at more or less frequent intervals discussions in the motor press with regard to the merits of the various systems of motor-car propulsion, and in no instance has the high opinion in which a car is held by individual owners throughout the country been more thoroughly demonstrated or more undeniably established than in the case of the White Steam Car.

To deal with other than generalities in a few notes in answer to such a query as heads the foregoing paragraphs would be to repeat the arguments which usually confront the prospective motor-car purchaser both in the trade literature which is compiled for his particular benefit, and in the statements which perform the bulk of what might be called "showroom conversaziones."

The White Car is no miracle, but is a really good, serviceable, reliable motor-car, built to last, and possessing points of silence, absence of vibration, comfort of seating arrangement, splendid spring suspension, and flexible motion, which place it in the highest class for luxury.

\* \* \* \* \*

The White Steam Car is admittedly the world's premier steam car. As this book is intended primarily for the users of petrol cars, I will add but a note in recognition of the fact that many engineers still believe that "steam" is the power of the future and will eventually prevail. This claim the White has done much to advance. The silence and sweet running of the steam car are above dispute.

## BOOK IV

### TOURING

#### CHAPTER XXII

##### THE MOTOR TOURIST

TEN years of motor touring have filled a heavy note-book of mine with many a line of pleasant reminiscences. There is nothing more delightful in its way than to turn the pages of such a document as this. True, the lines speak of past delights ; in some sense they resemble the menu of a dinner which is eaten—but then it may have been an unusually excellent dinner and you may be still exchanging letters with the “little thing in pink ” who was your *vis-à-vis*. There are few motor holidays the story of which is not written in some friendship or other ; there are few which have not taught even the expert much.

It is the latter point of view which emboldens me to repeat at least one of my earlier articles on touring in France before stating the 1908 point of view. The paper in question appeared in *Cassell's Magazine* some two years ago, but it spoke chiefly of a tour in France in the early “nineties,” and to me, at least, it recalls an unforbidden initiative and a perfect holiday.

##### FRANCE AND THE CAR

Sir Charles Wyndham has a story of a chauffeur and a butcher's cart, which may well be kept in mind by the motor-man on his way to the Continent.

Sir Charles, it appears, was making for a southern port in a

friend's motor-car, when a pugnacious butcher, desiring to contest a right of way, as obstinate Britishers will, deliberately drove in front of the sturdy Panhard and waited to see what would happen. The good man does not appear to have been disappointed. Confused by the suddenness of the *coup de chemin*, so to speak, the chauffeur directed his aim full amidships, with the immediate result of over-turning both the horse and the butcher, and leaving the mutton in the ditch. The scene which followed appears to have been characteristic of a flourishing British industry.

"'Ere," said the butcher to Sir Charles, "you sit on my 'orse's 'ead while I go for the police."

There are ample joys attending motoring in England, but it is safe to say that the man who has not motored abroad knows very little of an engaging pastime. It is not alone that the French roads are incomparable, the police intelligent and the distances superb: it is that general atmosphere of welcome and of knowledge which chiefly delights the experienced motorist. Let him safely escape the snares of bucolic policemen on our English highways, put his car upon a steamer at Folkestone or Newhaven, and no sooner has he accomplished the dangers of the waters than he is in a land where the very children babble of the mechanical mysteries and every gate is open to welcome him. France is rapidly becoming a nation of motorists, of manufacturers battling sturdily for the trade of the world, and of a people who realise the enormous possibilities of this gigantic industry. In the villages you may find mechanics who would put some of our trained workmen to shame. The great national roads—blessed be the name of Napoleon!—are the finest in the world. The solitudes are magnificent. Shall we wonder, then, that so many Englishmen turn their eyes across the Channel when the musical word "holidays" is heard, and seek in new pleasures forgetfulness of the petty campaigns which British conservatism is still capable of waging against all that makes for mechanical progress?

I have made many long journeys on the Continent, but the memory of the first of them is not to be readily displaced.



The car was an old 12-h.p. Panhard, the month was May, the destination Bordeaux. I can well recollect with what wonder and pleasure I first beheld a French highroad, and the bewitching novelty of the whole experience—even to one not unfamiliar with a motor-car. No sooner had we left Versailles behind us than we seemed to enter upon a great avenue, vastly wide, superb in its surface, everywhere bordered by acacias in full bloom ; and this road, with scarce a break in its magnificence, was the one which carried us to the Garonne. If there were any criticism to be offered, it was that of the rural desolation, so marked, so weird, that, in the end, we seemed to be travelling almost through a depopulated land. I can well recollect one stretch beyond Tours of nearly twenty miles of absolutely straight road, upon which the only living thing to be discovered was an old priest sitting by the gate of a wood and diligently reading his breviary. It is true that the route to the unsurpassable cathedral of Chartres reflected not a little of Parisian activity, and especially of the approaching race for the Gordon-Bennet Cup. I had never seen a racing motor-car until the first day of this adventure ; but as we drew nearer to Chartres I remember espying a white speck in the distance ; and this speck, approaching with incredible swiftness, presently took the shape of the spotlessly white figure of the great Frenchman, Girardot, out for a breather in his new car ; and certainly driving, even in those days, little less than sixty miles an hour. As a flash he approached us ; as a flash he went by. And the impression that remained with me was that I had never seen, in all my life, such an exhibition of daring and of speed.

It is a fine lonely road from Chartres to Tours, and if you make a diversion to Rambouillet, to the famous home of the daughter of Julia Savelli and her court, you will enjoy much picturesque woodland scenery, and understand, it may be, that peculiar note of melancholy which Zola has struck with such effect in all his accounts of Western France. Here is a land where the peasant is, for a truth, bent down toward the earth from which he sprang. Vast plains suggest interminable distances and horizon infinitely grey. The note of bells

comes musically from afar, but does not lift the peasant from the soil. There is a vast chilling silence on the scene. A man is afraid almost of the sound of his own voice.

At Tours, where all the talk is naturally of Balzac, I remember a quaint hotel where the majority of the bedrooms were upon the ground floor—a convenient arrangement, if the soldiers and their love-making be left out of account. I have lively recollections of being aroused somewhere about the hour of midnight by a gallant defender of his country who had seated himself upon my window-sill and there addressed a somewhat incoherent proposal of marriage to a fair lady who was not visible. Apart from these trifling objections, the hotel was a typical example of those comfortable old hostelries which await the motorist in France and are invariably remembered by him with pleasure. True, the request for a bath sometimes provokes unexpected astonishment. I have even been told that there was not water enough in the house for such a mad undertaking! And I would strongly advise all tourists to include a rubber bath among their luggage and to be firm when their demand is for water.

From Tours you follow a flat and lonely road by Poitiers (which gives the man of dates his opportunity) southward to Angoulême and the house which Balzac builded upon a hill. This is now, *sic transit gloria*, a comfortable hotel, and one, I should imagine, surpassed in its view by none in France. Far below you, as you stand upon the balcony of a bedroom majestically dingy, stretches the valley of the Garonne and all its historic vineyards. Here are the thousand farms which put the claret upon your table. Here is your wine merchant's circular set out, not at so much a dozen, but in smiling acres and fertile fields which border the mighty river of the south. St. Estèphe, St. Julien, Pommard, Château La Rose—you will be greeted by some familiar name every step of the road hence to Bordeaux; and once within the city, the wine of kings is at your command. Let the teetotaler reflect that we are here to-day and gone

to-morrow. The evening is ours, but the morning of the day is his.

I am writing of this road to Bordeaux merely as a *route nationale*, of which, as we know, France can boast abundance. There can be no more delightful holiday than one spent in this enchanting land. Nor need the cost of it affright even the parsimonious. It is true that you must, upon entering France, pay twenty-five pounds or so to the capacious maw of a frowning Custom-house. But this money is faithfully returned to you upon leaving. And, for the rest, you will more than save the fee for crossing by the moderate figures of the hotel bill with which you will be presented. A motor-car is now to be sent direct from London to Boulogne for a fee of two guineas. You can ship your car from Havre to Southampton for seventy-one shillings and three pence; or from Calais to Dover at five guineas. If you be a member of the Automobile Club—which of course you are—the subsequent proceedings will interest you very considerably; and you will get your permission to circulate and to drive as readily as a man can buy a paper. The examination to which you will be subjected by an obliging Frenchman remains a demonstration of Gallic courtesy. I drove my car the length of a street and was then addressed with a cheery “olright.” It is true that this obliging gentleman subsequently added the information that his brother sold motor tyres and would be glad to fill up my tank with petrol. I bowed to the blessed traditions of liberty and, with a side-glance upon equality and fraternity, hastened to grease the wheels of a brother so obliging. But the formalities, provided a man can drive at all, are the merest farce. And once they have been obeyed, the rewards are rich. I would only add the warning that it is exceedingly dangerous and monstrously foolish to set out for a motor tour in France without first obeying these useful laws. Certainly the French authorities will stand no nonsense. If a man be caught driving without his “papers,” he will have three days’ imprisonment in a dirty cell, though he were the great Sir Lord Cambell-Balfour himself. And “sarve him right” will be the general verdict.



Frenchmen, indeed, are omnivorous in demanding your "papers." In my experience, however, they are excelled in this pleasant weakness by their neighbours, the Spaniards. Driving a car towards Irun and the frontier, a friend of mine was one day stopped by two civil guards—so-called, I believe, from the freshness and the originality of their language. These men spoke no English, but they asked, truculently and with violence, for my friend's "papers"; and upon his producing an English passport, which was all that he carried, they immediately announced their intention of conveying him to the nearest guard-house. As this lay ten miles distant upon the road he must follow, he consented to go with them; and being arrived at a little wayside station, he was there confronted by a liliputian lieutenant who had no more English than his subordinates, but whose language was even more alarming. This officious person carried the precious passport, as a treasure, into his private office, and there we may imagine he began to spell it out as best he could. Doubtless the magnificent flourishes with which "We, Talbot Gascoyne Cecil, Marquis of Salisbury, etc.," recommended my touring friend to the care of foreign authorities was completely misunderstood by this earnest man, who immediately came to the conclusion that the Marquis of Salisbury himself was touring in Spain and that he had arrested him. What pen may describe the scene which followed! Behold the lieutenant, literally running from the station to the road, prostrating himself before the astonished motorist and hastening to assure him that the guard should be immediately turned out.

"I did not know," he said, "that my Lord Marquis was travelling in Spain. Ten thousand apologies. I abase myself at your lordship's feet."

And did my travelling friend object? Wise man—not a word. As a true defender of the British honour, he permitted that escort to accompany him, and in semi-state he arrived at the gates of the delectable land.

## CHAPTER XXIII

### TOURING ABROAD—*continued*

THE fact that time flies is brought home to me somewhat humorously when I read again the article I have quoted in the previous chapter. It is odd, in this year 1907, to hear of "a little old-fashioned hotel" at Tours where the soldiers came to make love upon your window-sill. In truth, they pulled that famous old place down long ago; and there is now a vain palace in its stead, where you may hear the very latest American phrases going to and fro like shuttlecocks over the dinner-table. Nor is it, I think, any longer possible to speak of touring in France in terms of unmeasured praise. The old charm is there, it is true; there are thousands of miles of unsurpassable roads; we can, especially if we visit the remote south or west, still discover those paths of primitive solitude so delightful to us—but heaven help those who motor overmuch in the environs of Paris. I drove over the road from the capital to Fontainebleu recently, and found it but a sea of flints. The dust, the noise, the stench were unbearable, and Fontainebleu itself resembled a motor garage. It reeked of the Bourse and Wall Street; the dresses blinded one; the chatter was deafening. And the same story is to be told of all the great highways near the city. There is neither peace nor comfort to be found upon them.

My own advice to the amateur who would make his first tour in France, is to travel either through Brittany or south to Toulouse, Tarbes, and that bewitching country of Provence. He will cross the Channel by the Folkestone-Boulogne route, of course, and pay a new tribute (we all have paid it) to the courtesy of Major Stevens, who is in South-Eastern command at Boulogne. I have shipped a car by the Folkestone-

Boulogne route upon many occasions, and invariably met with the greatest consideration at Major Stevens's hands. Not only do his clerks help at the seat of Custom, but the methods by which the cars are handled could hardly be improved. They stand out in sharp contrast with the rough-and-ready treatment to be met with at other ports, and I am not surprised to hear that Boulogne is now capturing the best part of the Continental motor traffic. Major Stevens has insisted from the first upon cars being hoisted in trays. This saves our paint, and is so satisfactory that it is hardly worth while to pay an insurance policy against the transit. Elsewhere the story is sometimes different. I had my wheels nearly stripped of paint upon one occasion, and a remonstrance merely obtained the assurance that I was lucky to be landed with any wheels at all !

Let it be said at once that, whether we go *viâ* Southampton and Havre or by Folkestone and Dieppe, the Automobile Club can be of great service to us. It is now possible to pay Custom duties here in London, and to leave them as a permanent deposit until the month of December in any given year. This means that we may go in and out of France as often as we please during the twelve months, providing we are careful to have our papers properly stamped by the Custom House officials upon entering the country and leaving it. As for the French papers, if we have a club-driving certificate, our French permit to drive is now issued as a matter of course ; but we must still get our permit for the car—and that, to be candid, is better got at Havre than at Boulogne. The timorous beginner, afraid of the reception which may await him across the Channel, should put himself boldly into the Club's hands, and he will be cared for as an only son. But the "old hand" will certainly go *viâ* Folkestone and Boulogne, for Havre makes no appeal to him.

Writing in the autumn of the present year concerning the stereotyped exodus from our shores to the several ports across the Channel, I made the following observations :

"The motorist in search of a route is a person we meet frequently just now. There will be, of course, the general



exodus to western France during the next few weeks. Some hundreds of Englishmen and Americans will again listen to the resonant voice of the guide, who tells us the story of Diana of Poitiers and the nimble Francis. The château country will claim its tribute as of yore ; no man may doubt it. People with but the vaguest notion whether Henry killed Guise or Guise killed Henry will climb the steps of Blois and hear once more the tragic tale in a tongue they do not understand. So much is very natural, for all Europe has not a more bewitching country than this. The road to Bordeaux is undoubtedly the finest in the world.

"The western tour, should the present doleful weather continue, will open to us a wider horizon. It is commonly too hot in July to contemplate any journey which carries us south of Angoulême. We get to Tours, perhaps turn eastward to Blois and Orléans, succumb to the desire to see if any one is still in Paris, and wind up at the Jardin de Paris. But with July promising cool weather new possibilities present themselves.

"We shall continue from Angoulême to Bordeaux and Pau, see the famous church of St. Sernin at Toulouse, perhaps get over to the other coast, and ask the wine-growers to tell us of their troubles.

"This is a famous tour, and I do not wonder that the neophyte chooses it for his first venture abroad. When he is a little schooled in Continental travel, when he understands that Custom House officers do not draw their swords if they find a box of wax matches in his pocket, and that it is possible to get food without putting his finger halfway down his throat, then he may dare remoter countries. His second journey may carry him down the famous road from Paris to Avignon, thence to the sea ; but he will be a foolish beginner who risks his neck upon the Corniche while yet *in statu pupillari*. Perhaps he will do well to halt at Avignon, to see Nîmes and Arles, and then come home *via* Clermont Ferrand. This gives colour and height to the venture. It is a pretty run, and three weeks at least should be spent upon it, for there is much on the way that is very well worth seeing."

But what of eastern France? How rarely do you meet men who turn their bonnets towards the Jura! Whoever remembers that the Germans were nearly beaten at Gravelotte or would like to know how MacMahon felt at Wörth? There is a delightful expedition to be made to the battlefields of 1870, to Mézières, Verdun, Nancy, Belfort, Besançon, and then round the Lake of Geneva even to Chamonix. If this excursion has its drawbacks, they lie upon the German frontier. Not only is it somewhat difficult to find the German custom-house officer asleep, but the policemen also are inquisitive. Indeed, of all the countries in Europe, Germany is the most difficult at this moment for the motorist.

Personally I am hoping that the British editors who recently visited Germany have earned their bread, to say nothing of their salt, and made all this easier for us. It used to be quite another story. I can remember the time when you drove up to the German frontier in Alsace or Lorraine, waited until the officer had gone to have his dinner, and then made a dash for it. Once inside Germany all trouble ceased.

The police were then delightfully acquiescent; you saluted them and spoke in the worst German you could command, to which they answered in the neatest and most satisfying English. The people were civil, the hotels took you in. Alas, however, that it is all of yesterday; gone into the *Ewigkeit*.

What you have to do when touring in Germany nowadays is chiefly to keep out of the country. If you venture it, prepare for quick payments and small returns; and go first to Mr. Herbert Gladstone with your certificate of registration and your licence to drive. These Mr. Gladstone will stamp for you, and having given you his blessing in German will send you on to the consul-general for Germany, who lives in the suburbs of Finsbury Square. This gentleman will also bless you in German and cover you with red ink, after which you may present yourself at the German frontier and pay up forty good marks for the privilege of getting rid of them. This new tax permits you to stop in Germany for exactly thirty days; if you stop for thirty days and a quarter-of-an-





A 20-28-h.p. Spyker Car.



The Adams-Hewitt Car.





hour you will be haled before a person in gold lace who will take possession of your car to show that there is no ill-feeling. But in thirty days you will have had enough of it and so escape this danger.

As for the custom duties, they amount to varying sums, according to the disposition of the gentleman at the frontier. It is no longer possible to pass this worthy while he is consuming beer in a neighbouring restaurant and crying "hoch" for the Kaiser. Should you do so he will telephone on to the nearest bureau, at which you will be promptly arrested and threatened with a sword. Sometimes, I am told, at remote stations such as those near the battlefields the local official is so overjoyed when you pay up the tax that he forgets to think of the customs at all; in which case you pay nothing, and get it back on leaving the country.

Perhaps one may admit on pressure—often applied in Germany—that things have been a little exaggerated by other English tourists and that it is still possible to enjoy a very pleasant holiday in that delectable country. The experiment, at any rate, is well worth making by those who go to eastern France and desire to see the ground upon which von Moltke stood and Bismarck chose his cigars. In Paris, unfortunately, they do not think so, and the members of the French automobile clubs are earnestly exhorted to avoid Germany altogether in the present touring season. I have not myself visited Germany in a car for some two years, but I can scarcely believe that things are as bad as French report would have them to be.

If touring in Germany be a business, a very different account may be given of touring in Holland. I have had the privilege of a chat on this subject with Mr. Wellington, who has now become Herr Spyker's right-hand man at Amsterdam and who gives me a very roseate account of the possibilities of Holland. The roads are *pavé*, it is true, but not the *pavé* we associate with Belgium and north-eastern France. They are, in fact, Napoleonic roads, and the *pavé* is excellent travelling. Mr. Wellington tells me that a most delightful round can be made in a fortnight and invariably to the satis-

faction of the tourist. You put your car upon a ship in the Thames and wake up at Amsterdam. There, naturally, you visit Herr Spyker's works and see his new and admirable cars. You visit Haarlem, The Hague, Rotterdam, Utrecht, Arnheim, and again daring Germany you reach Cologne and then strike across for France. Holland itself is all-sufficient for the less venturesome, who should consider the country when making their summer plans.

These *pavé* roads about Amsterdam would seem to demand that we run through upon plain tyres ; Mr. Wellington certainly does not recommend non-skids. The roads of Holland are not hard upon tyres ; they are suitable for fairly fast-running and for highly geared cars, and they certainly will appeal to all who love great spaces and whose eyes are gladdened by a far horizon.

Whatever route we choose, by whatever road we travel, this touring across the Channel remains for many of us the supreme desire, the final tribute to the motor movement. Who has not a treasured recollection of glorious hours ? Who has thus travelled and remained insensible of his privileges ? Sitting here in a dark study, the gloom of London round about, I can depict an old French inn upon a height, red roofs and Gothic spires below the terrace upon which I walk ; pink roses twining everywhere, and for my horizon the unsurpassable plain of the Garonne—that vast immensity, the wine country, that superb river we meet with such pleasure at Bordeaux, winding by the châteaux that have stood upon our dinner-tables through all the years of manhood. There is sunshine upon the town, miracles of peasants loll at their doors as they have lolled in many a picture which the Salon has given us—there are soldiers going to and fro briskly ; perchance an old priest reading his breviary, but still with an eye for those who may be sinning as he goes. I know that I am in old France, and its atmosphere is all about me. And God send that Chicago may not come here !

The day is before me—the sun will shine through the long hours as it is shining now. My good car stands yonder



ready to take me wheresoever I will. Shall it be to yonder unbroken horizon amid the vines and châteaux—or shall the west and north call me? In Paris the Bois will be a very garden of roses ; to-day, even old London may have seen the sun and rejoiced. But I am at no man's beck and call—the car will annihilate distance for me : north or south, east or west, it shall carry me to-night to some sure haven such as this—where young men and maidens will laugh through the twilight, where the streets will be narrow and steep, the church a shrine of glorious antiquity, the inn a house that the children of romance have known.

And this liberty is my holiday—these hours the roses which my car shall gather.

## CHAPTER XXIV

### ENGLISH TOURING

**A**N old motorist was telling me recently that a tour he made in England last Easter was entirely spoiled by the limitations of the Island. "I had used the country up in a week," he said ; clearly proving (*a*) that his was a case for the police, and (*b*) that he knew nothing whatever of touring in the proper sense of the word.

Here was the possessor of a monstrous car ; flying headlong upon the highroads ; leaving, I do not doubt, dust and execrations behind him ; rushing from hotel to hotel ; telling you of his two hundred miles a day ; damning the old monuments as he went—just a type that is disappearing, the type that discovered the motor-car and made its merits known to us. The sane majority even of those ancients have lived such impulses down. We have learned how to tour, we have learned to appreciate our own country even in the face of its limitations.

And here a glance aside. There are many people who will not tour in England because of the police. They tell you that it is shameful to be trapped upon open highroads, a disgrace to British justice that men should be convicted by rabid anti-motoring benches upon the evidence of lying policemen. Far better, they say, to go to France and Italy, where common-sense prevails, and the police do not forget their manners. These are the good folk who speak with contempt of such benches as are to be found in Sussex and Huntingdon and Warwickshire, who tell you that notorious anti-motorists sit openly in judgment upon their fellow men, and are not ashamed to boast of their disgraceful rulings ; who ask what pleasure is to be found upon the

English highroads while such things be. To whom I answer that, with the exception of one or two counties the policeman bogey is greatly exaggerated, that the majority of the benches do consist of men who attempt to bring an open mind to their assistance, and never forget that they are English gentlemen. Even the half-pay colonel, the farmer with hay to sell, and the local auctioneer with houses to let, are sometimes reasonable—I have known an instance. Time is with us, for time must establish mechanical traction beyond all dispute. We must suffer the lying policeman yet a little while, continue for a season to regard his monstrous boots as an unpleasant object upon the wayside—but in the end we shall beat him. As well might he attempt to sweep up the sea as to arrest the progress of this mighty movement.

So let us pay our fines cheerfully, regarding them in some sense as a martyr's contribution to a good cause. When even bishops are dragged to the police-court upon a charge of exceeding the speed limit, then may the mere lay mortal abide in cheerfulness. A law is not a good law which the majority of men break without shame. Those of us who are most concerned with the motorist's honour understand better than others, perhaps, the very deficiencies of the present Act and the way it has lent itself to abuse. We desire to protect the public, to be as little annoyance to the public as we can; but we know that the public is not protected by summoning a man for driving at twenty-five miles an hour upon an open highroad, and that many of the so-called cases of driving to the public danger are trumped up by the police in the most shameless manner. In the end wisdom will prevail, but until it does prevail we must suffer with what grace we can the intolerable injustice which is meted out to us.

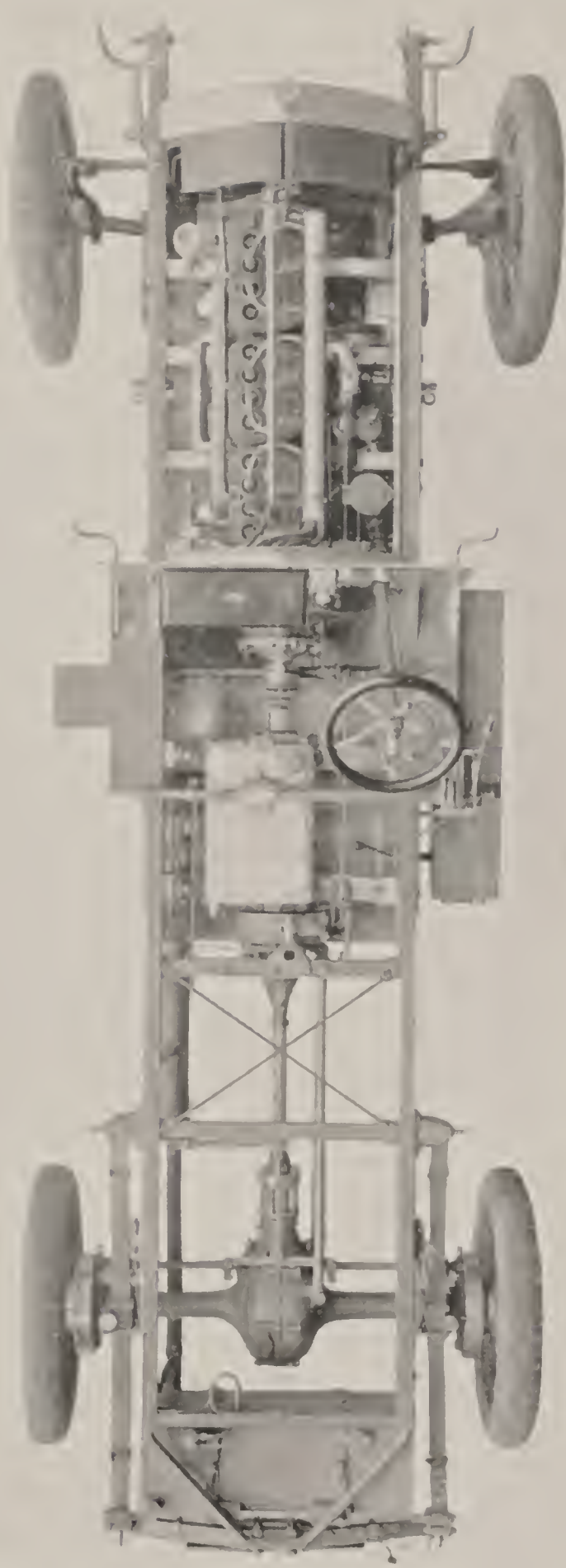
An over-praised bogey, this of the police, I say, and one which should deter no tourist who, for the time being at any rate, would see his country, his whole country, and nothing but his country. There is no law which compels us to tour either in Suffolk, in Huntingdon, or in Warwickshire. If we pass though those delectable counties we can travel



with such discretion that even Constable Allboots will be hard put to it to swear away our reputations. In the main, we shall go unmolested where we deserve to go unmolested. I have known men who have driven twenty thousand miles in England and never heard of a trap. Others fall into many traps in the first month—it is a question both of luck and of discretion. Now that we have the invaluable A.A. scouts upon the road to assist us in many ways, I would even say that luck is becoming of less account than prudence. And surely it is the duty of every motorist to support this admirable Automobile Association, and to encourage it to the utmost of his power.

Let us suppose, however, that our amateur is above these wild alarms, and is determined to see England in his car. Whither first shall wisdom carry him? Upon what highroad will he travel? Certainly his object will not be to see many men and cities, but rather to seek those solitudes of which the poet Shelley has spoken with magic eloquence. For my part, I know no road upon which I would sooner make a beginning than the great highroad to Norwich. Setting out from London *viâ* Barnet and Hatfield, making for Stevenage and Royston, thence I would go to Newmarket, upon one of the finest motoring highroads which exist out of France. It is true that the village of Newmarket has been exceedingly unkind to us during recent months, but, at the worst, Newmarket is the matter of a mile or so of exceedingly careful driving; and directly we have passed its toll-bar we are away to Norwich upon a track whose every mile is one of pure delight.

I say that it is a good road for a beginner, and I say so advisedly. The traffic problems presented are few. There are no dangerous hills. Should the amateur desire to try the speed of his car, he can do so without risk. And when he has arrived at Norwich there are many miles of delightful motoring before him, quiet drives through lonely lanes, the gloriously primitive Norfolk villages, for towns Cromer and Hunstanton, Yarmouth and Lowestoft—but chiefly a world apart; a world of men and women to whom London is



*Photo by Campbell-Gray, 17, Chapside, E.C.*

Chassis of the Six-cylinder Napier.





hardly a name; whose longest journey abroad has been to a village not less primitive than their own; a people with little love for the "furriner," but a very devotion to the herring. To live amongst these upon their wonderland, to visit marsh and fen with them, to sail a wherry upon their rivers and broads—such are some of the rewards which life has in store for the fortunate. And the motor-car opens up this land of magic as with a magician's key. No longer do distances exist. There is no village so remote that we may not visit it—no place so hidden that we may not seek it out.

For a second journey from town, I would name Gloucester and the west. Let our amateur drive from London to Oxford upon that famous road through Beaconsfield and High Wycombe; let him lunch before the windows of Balliol and tell himself (if he be a Cambridge man) how greatly superior is Trinity to anything in this overpraised town; let him go thence to Gloucester, and, making the "New Inn" his headquarters, let him prepare for the Forest of Dean, for Tintern; and afterwards, if time permits, for the famous valley of the Wye, which shall reward him generously. Such journeys as these will make a motorist of him beyond all hope of cure. He will be driving to Edinburgh soon, talking of the lake country as though it lay just beyond Regent's Park, and speak of Ireland in terms of warm eulogy. And John-o'-Groats—why does not the fellow live somewhere at the top of Scotland? Let us get the car out and dine there before the week is out.

Let me, despite these just ambitions, utter a word of caution in this place. However clever our novice may be, I beg him, for some months at any rate, to keep away from mountainous countries. It is all very well to "pooh-pooh" the dangers of the Scotch passes, to deride the difficulties of driving in Devonshire and Cornwall; but they are facts none the less. One of my oldest friends was nearly killed upon Porlock Hill, in Somerset, because his brakes fired and the car ran away with him. Had he been more skilled, he would have put in the first gear before attempting so dangerous a descent, and so saved a distressing accident. In the same

way, a man should have had some years' experience before he attempts to drive upon a mountain road, with a cliff upon one hand and a precipice upon the other. Panic may fall upon him at any moment. Should an emergency arise, it is many odds to one that he will do the wrong thing. Even after many years he may embark upon such roads with just trepidation.

One of my motoring nightmares is Mr. Weigel's account of the famous accident to the Darracq driver in the Paris-Vienna race of 1902. The course upon this occasion crossed the wonderful Arlberg mountains, a continuous climb to vast heights—the rugged cliff upon one hand and a sheer drop of many thousand feet upon the other. Almost at the top of the pass, after many windings and twistings, about that which might have been the dome of St. Paul's, Mr. Weigel came upon apparently a straight stretch of road, and there he espied the driver of the Darracq just ahead of him. Much to his astonishment, the poor fellow disappeared almost instantaneously from view, leading those behind to the impression that the track descended with marked abruptness. In very truth, however, it did nothing of the kind, but merely turned the bend of the rock at a right angle—a fact of which the unlucky pair in the Darracq had been quite in ignorance, for they held straight on and went clean over the precipice. When a friend obligingly held Mr. Weigel's legs, that he might peer down the abyss, he discovered the car, looking no bigger than a toy, many thousand feet below; but Max, the driver of it, was nowhere to be seen. Naturally, it was impossible to believe that he could be alive; but lo and behold! he came climbing up the pass from the depths presently, and merely remarked upon his wretched luck and the apparent impossibility of getting the car upon the road again. As for the chauffeur, he, happily, had been caught upon the brink, and was not even bruised—nor does any one know to this day how his companion escaped. Possibly he fell upon a ledge of rock some little way down the abyss; there are those who say he was caught in the branches of a tree. The truth, perhaps, will never be known.

It being granted that our amateur will not drive upon such roads until he is master of his car, I may utter a word of caution concerning driving at night. This has been mentioned in other chapters, but the warning cannot be uttered too often or with unnecessary emphasis. Night driving is perilous even to the oldest driver. The finest eyes in the world will tire sometimes when trying to follow the path of a powerful acetylene lamp. Should the beginner be compelled to drive at night, let him go with great caution, never exceeding fifteen miles an hour, and pulling up instantly should the road confuse him.

I recall vivid experiences of night driving and one or two pretty escapes which might have been pretty accidents. Driving down into Lyons upon one occasion, the hour being almost midnight and the season winter, we came upon a heavy road mist at the steepest and most dangerous part of the descent. I lost the road entirely, and remembered forgotten litanies. Nor were my nerves braced up by discovering, at a moment when the fog lifted, that my off-wheel was within nine inches of the brink of a chasm which dropped sheer many hundreds of feet. This is the kind of thing you remember when you have supped after the theatre, and the white wine has not agreed with you. It is also the kind of thing not to remember when you travel the same road again.

Then, as a minor point, what of the domestic or ambulating mule? He is a mouse-colour, perhaps, and your lights do not discover him. Sometimes you may not be aware of his presence at all until the bump awakes you from dreams. I remember overtaking a mule upon the Great North Road, and knowing nothing of the occurrence until his heels struck my bonnet with a resounding thwack. Possibly I had been aware of some movement, apprehended danger almost instinctively, and slowed down to a mere crawl; but the mule was certainly there, and having shattered the near-side lamp with one kick, proceeded to deal equal justice to the other. This was amusing enough (from the mule's point of view); but when his owner immediately demanded £5 as compen-



sation, it occurred to me that the limits of comedy had been reached.

Happily the perilous side of motoring is one that needs but occasional consideration. There is nothing safer, nothing more delightful, than this English touring when the car is driven in a rational manner. Of all the restful days I know, commend me to that which wakes me in a remote country town, and I know that a quiet day's driving is before me. Last night, perhaps, I made the "inn" in good time to visit the Close and the cathedral precincts. Disdaining the *table d'hôte* at 7.30 (full well I know the horrors of that in an English country town), I ordered a chicken and a pie and a "snipe" to wind up with. The "snipe" had come in a bottle—excellent old port of real vintage quality, and in a measure that even the faculty would approve. And afterwards there were the mock busy streets, the country shops, chaw-bacons at all the corners, Phyllis shy and peeping; and the bells—the majestic, all-musical bells ringing down the ages—the bells to which priest and puritan alike had listened; the call to Mass and Matins—what would a cathedral town be without them? You sleep to their music, you awake to their recall, leaping up from dreams which a great four-poster blessed. Perhaps Pickwick has buttoned up his gaiters in this very room; here Tupman may have come to steal Winkle's coat; Tom the bagman sat in yon chair, and winked at the widow in the yard below—the world of Dickens before other worlds, as it must ever be in the bedrooms of an English inn.

And then the morning of the day. The great cathedral is open by this time, and your business is to deceive the verger, who would tell you of saints and sinners, of the living and of the dead, of the first founder and the last restorer (whom God forgive). This man is your enemy. Your mood cares nothing for Gothic or perpendicular; you call no curses upon Wyatt's head; it is of no interest to you whether the bones of Henry the king or John the scullion lie beneath the stones you tread. Willingly are you paying homage to the dead past, but not as these men pay it. This mighty temple stands to

you for the aspirations, the hopes, the fears, the joys, the tears of a thousand years. How many have knelt at these altars! What whispered confessions of love and hate, of crime and sorrow! All buried, all forgotten—washed by the seas of time to the shores of eternity. Priest and penitent gone together; lover and maid; stern monk and grinning novice; cavalier and roundhead—Time had done with them; the curtain is down; the play is ended. But this building stands supreme. Here was the centre of a mediæval world. God knows of what it is the centre to-day, if not of the hopes and ambitions of petty canons and the intrigues which the Dean's lady was early to detect.

But the sunshine wakes you from your dreams for the second time. You are out in the close again, and the material side of you whispers "ham and eggs." It must be ham and eggs, it could be nothing else in such a place.

Coffee, of course, they cannot make; but you will get plenty of good tea, and toast which is toast, and not bread with a margin about it. This you consume at leisure, and then for the car. An obliging ostler (if he has not put petrol in your water-tank, or *vice versa*), will turn you out spick and span. You pack up the luggage, load "her" up, to the delight of the High Street, shake hands with your host (who is there for no other reason), and are away again. It will be another town to-night, again a great church or a beautiful river calling you,—but what a sweet-smelling country between, hill and dale, meadows, English meadows and the glory of their blossoms, the old winding road, mile after mile of its white and patient face; and the villages, here upon the hill-side, there in the valleys, or smiling between the trees, or hidden away just where no village ought to be! The pageant is an unending delight of view and vista. The air is a very draught of life.

You will lunch in the open air, of course, and thereby save much money. A luncheon basket is an indispensable adjunct to any car. There is nothing in the whole story of motoring more pleasant than the *al fresco* luncheon taken upon the borders of a shady wood, or upon the grassland

of a sunny common. As things go, the hotel-keeper will rarely let you off under twelve or fifteen shillings for a party of four and a driver, but you can lunch by the road-side for five shillings, and well at that. Tea, as I have said, is best taken at an inn; but about lunch there should be no two opinions whatever, nor will there be before many months have passed. This motoring is always an expensive pursuit; but we can lighten the expense of it in many ways—and none more so than by taking lunch in the open air when touring. Wise also is the man who makes a centre for his travels, driving from London, say, to Cromer, Lincoln, Gloucester, Shrewsbury, Winchester, or some other considerable town; whence he will make some well-planned excursion every day. Otherwise he must tip a whole staff of servants every morning at breakfast time. There is positively no alternative—a fact which many forget when planning a holiday and trying to estimate the cost of it.

This question of money, unfortunately, will intrude, and even the glamour of our pastime is unable to blind us wholly to a wise consideration of ways and means. Speaking by the book, I have found it almost impossible to tour a party of four in France at a less cost than fifty pounds a week, while in England the cost may be a little more. There is no good attempting to disguise the fact that the English inn-keeper believes all motorists to be millionaires, and charges them upon such a belief. The day will come when competition will help him to change his opinion and to learn wisdom—but that day is not yet. Meanwhile he is robbing himself of much profitable custom, sending many to France who would be very chauvinists if their means permitted them to remain at home. Let him consider the matter before it is too late.

There is but one word more to be said concerning touring in England, and that is a word concerning our clothes. Let us always remember that we shall rarely be too warm upon a motor, and may often be too cold. Heavy overcoats should always be carried in the car, which, of course, will be provided with a hood and a glass screen. It is wisdom to dress even in summer as though spring or autumnal weather must be



looked for. I believe greatly in good frieze suits for men and woollen underclothing. Wear a knitted waistcoat if you like—you will have a dinner suit in your bag, and be comfortable o' nights. But never dress lightly because the sun is shining, nor forget your heavy coats because it is not raining. These will be of stout cloth lined with fur—I do not believe in leather clothing, which is neither warm nor durable. Good cloth is at all times worth a dozen of it; while for a woman fur appears to be the only thing for heavy cloaks. True it is that in the summer we prefer the ample waterproof to the fur coat, and this is best got at Burberry's—experts in the matter, and knowing even better than we ourselves what is good for us.

The main thing to remember, however, is that we have no climate, and that of all our national friends the Gulf Stream appears to be the most fickle.

## CHAPTER XXV

### LUGGAGE-CARRYING

I READ in the technical press recently a noteworthy letter concerning luggage. This is a subject very much in the air, or in the dust, just now. There must be some hundreds of cars going over to France every week, and we may be quite sure that luggage-carrying is a problem to every owner. The letter to which I refer speaks of our troubles in no measured terms. The writer, Mr. Wills, declares that things have been going from bad to worse. He could not be more emphatic in his indictment.

When we first went touring on motor-cars we were the willing victims of discomfort. Our interests then lay in the novelty of the thing. It was wonderful to be whirled through the country at these high speeds, to obliterate distance, and to enjoy the bewitching revelations of this fascinating pastime. If we did not send our luggage on by train, we were content with any old hand-bag, tossed at hazard into the tonneau. Everything became secondary to the domination of enthusiasm. It was delightful to arrive at hotels and not to be recognised by our friends. A very muddy man passed, *ipso facto*, for a better motorist than a less muddy man. It took about three weeks to get the dust out of our hair, and we rather liked to keep it there. After all, we were the pioneers and our future did not lie behind us.

The second stage was one of apology. We were beginning to admit the claims of the man who must trouble about such trivialities as clothes. Of course he would have to put his clothes somewhere—though he was a beast to mention them—and they went well enough with the petrol cans. A few makers began about this time to put luggage canopies upon

their cars, and upon these canopies the particular man put his luggage. This proceeding was little to the liking of the true-blue motorist. The canopy with heavy luggage to add to its deficiencies affected the gravity of the car strangely. We were face to face with the risks of a capsize, and could not ignore them. When the luggage was too heavy for our canopy and threatened to come through upon our heads, then we had to sit heroically and hold it up with our feet. In very few cases was the innovation a solution of this troublesome problem.

Mr. Wills declares that the golden age of luggage-carrying was represented by the old 12-h.p. Lanchester. When Mr. Lanchester put his engine in the middle of the chassis he built over it an admirable receptacle for luggage, and one never bettered by any modern device. You could put two portmanteaux in the space between the front and back seats and keep them tolerably free of dust. Later on, however, Mr. Lanchester submitted to the popular clamour, and his cars became in shape much as other cars. Once more the luggage problem faced us. Our twenty-guinea dressing-bags (full of wonderful implements upon *The Times* system) again reposed with the extra can of petrol upon the floor of the car. Failing this, it went upon the grille behind—but we were always anxious about it, though we did not remember an occasion upon which we used the two hundred implements aforesaid.

Some people object to this grille very much, but I am inclined to think that it is unjustly abused, provided the trunks we put upon it are made by some one who knows his business—say, by J. B. Brooks, of Birmingham—then there is little to be said against it. It is necessary, at the same time, to be sure that we do not throw any undue strain upon our rear springs. I remember driving a little 15-h.p. car of which the carburettor refused to act when there was heavy luggage on the grille; in other words, the car was tilted up at the front, and the petrol did not flow. This was an exceptional case, and needs little consideration. The number of such cars is small, while high-powered machines with well-



built back axles will carry any amount of luggage on the grille. Those who travel in a modern limousine know little of these difficulties. But its stuffy atmosphere, the sense of confinement, the limited view, deprive this class of carriage of any claim to serious consideration upon the part of the true motorist.

So far as luggage-carrying upon an ordinary side-entrance car goes, I think much can be done by using the long foot-board for tools. I saw a Rochet-Schneider the other day, of which the footboards were very nests of cunning boxes. The driver told me that he could carry all his tools in the various enclosed trays upon the footboard, a provision which left the large compartment under the rear seats at the disposal of the travellers. These carried two large trunks upon the grille behind, and used the space in the tonneau for hold-alls and wraps. The hold-all is a much-abused contrivance, but I am inclined to think that it plays an excellent part in the equipment of the car. Its chief advantage is that it is soft, and does not scratch the paint. You can carry a couple of hold-alls in the tonneau, and cover them with a rug to keep out the dust. During a recent tour in the West of England I made the discovery that clothes thus carried were in a better state at the journey's end than any I have taken with me on such a tour before.

The main thing, after all, is to acquire the habit of carrying little luggage. A change is necessary, and with that a dinner suit, but Louis Seize clocks and inlaid gold jewel-boxes are much better in museums. Whole wool if you like, but not too much of it. For my part I am directly opposed to the system of sending luggage in advance. There is no greater bore living than the man who hurries to the railway station directly he arrives to see what has become of his Japanese silk dressing-gown. This man prefers Irish frieze to gobelins. He would not cross the street to see St. Peter's if his fancy waistcoats had not arrived. You arrive at Gloucester, say, and wish to run on to Stratford-on-Avon. You find that he has notions of his own, and has booked his luggage to Bath. I have known such a fellow spend the best part of the day in

asking a London and North-Western Railway clerk what a Great-Western clerk has done with his dressing-bag and the twenty scent-bottles it contained. He could not keep away from his bag, and temporary separation moved him almost to tears. So have nothing whatever to do with the guest who wants to send his luggage on. Let him go by train, and you take the bags. ' It is the wiser course.

Luggage equipment, remember, is not expensive, and wise provision adds greatly to the comfort of the tourist. You can buy a couple of excellent trunks to fit the grille behind for seven guineas the pair. Tool-boxes upon the footboards are comparatively inexpensive. The common or household hold-all is to be had for a few shillings. The great desideratum is order. See that your chauffeur keeps his tools in neat array, and does not distribute them over the car. Curb his disorderly ambitions, and insist upon your share of what accommodation there may be. The fellow will give in if you be firm ; he is likely to become an exacting tyrant otherwise.

## CHAPTER XXVI

### INSURANCE

THERE are many schemes afloat at the moment for the insurance of our cars ; but it is astonishing how many people remain uninsured—they just take their luck. Possibly they have an overweening confidence in themselves or in the dashing French chauffeur who came to them with such splendid recommendations. Other people have accidents, but they will not ; or if they do, a £10 note will cover the bill. Of course, the car might get burnt, and so they are not unwilling to insure it against the perils of fire. Perhaps they put on a small policy to provide for accidental damage ; but even if they think of it, their insurance against third-party claims is often grossly inadequate.

Now all this is a very serious matter to those concerned, and one which no motorist can afford to ignore. I do not know how the figures work out, but I should imagine that car fires are as frequent as any in the insurance market, while third-party claims must amount to a staggering total.

Remember that the most trivial accident may make a beautiful bonfire of your car ; you may get a back-fire in the carburettor, may find your petrol turned on and your tank burning before you can count ten. Or perhaps there is a slight leakage from the petrol-cock itself, a little petrol upon the floor, and then the obliging friend with a cigarette and a match appears. There is no more surprised person in Europe than this friend when, having thrown the lighted match upon the pavement, he sees a flame of petrol flare up above his head. Having burnt your car, he will speak of the shock which the explosion gave him. And he will add pleasantly—  
“ Of course the old 'bus is insured for twice its value ? ”



So we see that the risks of fire are very real indeed. Whatever care an owner or driver may take, it seems impossible sometimes to guard against the slight leakage of petrol which may work so much mischief. Fires will take place in carburettors whatever we may say or do. There is a cigarette-smoking confraternity which hovers about the bonnets of motor-cars wherever it can, and this has lighted many a candle in merry England which neither sand nor rugs will put out. My own opinion is that a man should be insured against fire to the last penny of possible loss. Everything in his stable should be covered—lamps and tyres, and even tools. The earlier insurance policies, at any rate, were often grossly unfair to us in this respect. Nothing but the car itself was covered by them. A man might have spent £100 in spare covers, lamps, horns, speed-indicators, patent hoods and screens—not twopence did the insurance companies care about this. We were victimised by them grossly until we discovered the truth.

It is therefore imperative for the insurer to see that the whole contents of his motor-stable are insured, and insured adequately. Let him be careful to specify this in his policy. If he goes to Lloyds *via* the Automobile Association or the Motor Union, he will do well enough. The policies issued by these companies cover nearly all possible loss. The fire-insurance clause provides for loss or damage to car and accessories by fire, explosion, self-ignition, or lightning anywhere in the United Kingdom. Why the same loss should not be covered out of the United Kingdom I myself entirely fail to see. At least, a trifling increase of premium should make this deficiency good—nor do I think that a policy would be refused to any hard-headed motorist who insists upon such an extension of the clause. Incidentally these remarks apply to the further insurance of our cars against accidental damage. We are insured under some policies issued at Lloyds if we bear the first £10 of the loss; but there is no reason whatever, transit excepted, why the companies should not cover us as readily when we are touring on the Continent as in England. The risks

certainly are not greater—the conditions of travel are precisely similar.

I can well understand the insurance companies refusing to include transit to and from the Continent in the ordinary policy. There are undoubtedly risks when one's car is being shipped upon a steamer ; and the nature of these is clearly marked when we remember that even the South-Eastern Railway charges us a sovereign to insure the safe passage of our car from Folkestone by Boulogne. The transit apart, and this could easily be provided for by an annual payment, I cannot for the life of me see why a motor-car, which is a touring vehicle, should practically only be fully insured when it is not touring. No doubt, as I have said before, some of the insurance companies profited greatly by our ignorance in the early days. I was once asked a sum equal to fifty per cent. of my whole payment for a fortnight's tour in France. All sorts of cunning clauses forbade us in those days to get a halfpenny for the very things which most readily suffered by a motor accident. We could claim if the car itself was damaged ; but when a butcher's cart smashed our valuable lamps, or a van burst a new cover, or a local repairer hit the speed-indicator with a hammer to see what was inside it, we never got a farthing. But we have changed all that, the Automobile Association and the Motor Union having greatly helped us to better ways.

Important as fire insurance and insurance against damage by accident are, I name them as trivial compared with the possible risks from third-party claims. This was first brought home to me when an unfortunate motorist in the south of London, a most careful driver and a considerate one, being practically half run down by a deaf cyclist, was compelled to pay £1,500 to that cyclist's widow. Notwithstanding the verdict of a coroner's jury which had declared emphatically that the motor driver was not to blame, a tender-hearted civil jury, assuming his wealth, immediately gave this preposterous verdict. If the injustice had a brighter side, it was in the warning it conveyed to motorists generally as to the risks the new pastime was bringing upon them. Even

owners of the smallest cars, men of the most moderate means, began to perceive that they might be ruined in an instant should a deaf or blind person walk into their car and a jury of sufficient hostility to motor-cars be impanelled.

From that time, no doubt, we began largely to increase our policies against third claims. We perceived that an accident, possibly unavoidable, might mulct us in a sum of a thousand sovereigns, or even more. Some people nowadays go so far as to insure against an individual claim of as much as £1,500. Their policies can be drawn to meet any number of these claims in any particular year. And I do think that a thousand pounds a claim, law costs excluded, is the very lowest sum that any prudent person should insure. This, of course, means somewhat a heavy premium. But those who insure at Lloyds get a return of a certain percentage of their outlay at the end of the year if no claim has been made. And it is important that we remember the frequency of motor accidents if we are tempted to regard such a preservation as extravagant.

I do not think there is very much risk of burglary where motorists are concerned. It would be extremely easy to steal a motor-car—extremely difficult to do anything with it when you had stolen it. There is no career for our sons in this business. Let a car be stolen and the news is flashed around the district before the thief has made up his mind which road to take; every garage in the country would be warned, every ostler would be on the look-out for the stolen car. Under these circumstances, insurance against burglary is a mere sop to the very timid; while the insurance of the owner himself is entirely a personal matter, with which we have little concern. Our chauffeurs nowadays must all be insured under the new Compensation Act. We pay a pound apiece for them and give ourselves no further concern about them. Possibly if there were a few less of the kind in the world, this would be a happier sphere. They are amongst those who never would be missed.

To put the matter in the briefest way, the ideal policy should run as follows:



Firstly. To insure the car, the lamps, the accessories, the tyres against fire to their full value.

Secondly. To insure the car, the lamps, the accessories, the tyres against accidental damage—the owner bearing the first five or ten pounds of loss if he wishes largely to reduce his premium.

Thirdly. To insure against third-party claims up to £1,000 at least a claim, law costs excluded, and any number of claims to be made in any one year. The Company to pay the law costs.

Fourthly. To rule out all conditions which would modify the payment of this premium, racing alone excepted. The car to be driven by the owner or any one he may appoint, such driver holding a proper licence.

Fifthly. The car to be covered upon the Continent. The transit to and from the Continent to be at the insurer's risk unless special arrangements are made to the contrary.

# BOOK V

## THE MOTOR-CYCLE

BY A. C. PEMBERTON

### CHAPTER XXVII

#### THE FIRST MOTOR-CYCLES

IN writing of the motor-cycle, there is no occasion to search histories. The invention and development of the mechanically propelled bicycle and tricycle are modern matters; indeed, the whole affair is one of a couple of decades, and of this period the last ten years embrace the real history of progress.

Previous to the passing of the Act in 1896, permitting the use of mechanically propelled vehicles on the highway and dismissing the man with the red flag, there had been several attempts to produce motor-driven cycles.

The first which came to my notice was a steam-driven tricycle, shown at the Stanley Show in the 'eighties. That this machine was capable of being propelled by power was conclusively proved when its inventor, a baronet of renown, came before the magistrates and was duly fined for using it on the highway. Let us hope that the police evidence in this instance was more accurate than is often the case to-day!

About this time a steam bicycle was also shown, with a small verticle engine and boiler on the head of the bicycle, driving on the front wheel, in a similar manner to the early front-driven Werners: but a very cursory examination was sufficient to convince any practical engineer that the power

was too small to be of any service, and nothing more was heard of it.

About the end of 1894 a petrol-driven motor-bicycle was exhibited at the National Show at the Crystal Palace and excited both interest and a good deal of ridicule from members of the cycle trade. Some of those who scoffed at this early attempt are now, ironically enough, large manufacturers of motor-vehicles. The machine was constructed with a two-cylinder petrol motor, the cylinders being arranged at the side of the rear compression stays of the bicycle, and driving direct—locomotive style—on the rear-wheel axle. The cylinders were water-cooled, and the tank for the circulating water was made to do duty as the back mudguard. Profiting by modern experience, it is now easy to see that any bicycle driven by an explosion engine in that direct manner was foredoomed to be a failure, but at that time it looked the most practical and simplest form of construction, and that it would go a friend of mine had a most convincing proof.

At the request of the makers, this intrepid adventurer made a trial of the machine, and no sooner had he started than he found himself unable to stop. The machine, gathering way with a series of appalling jerks, rapidly attained a pace of nearly thirty miles an hour. To abandon a hold upon the handles was to court disaster—my friend, needless to say, was quite unaccustomed to steer a self-propelled machine at a speed then thought terrific; and for nearly twenty miles was he hurled along a French road. In the end, becoming more confident, he managed to release his hand and to start turning the taps. At first his efforts only increased the speed, then they were but too successful. The machine pulled up so savagely that bicycle and rider came heavily to earth. No real damage was done, but the man returned by train; and although the victim has always been a staunch supporter of the motor movement, I have never heard of his again venturing on any form of motor-cycle.

A similar bicycle to the one described was taken at a later date to the Coventry track and shown in running order; but





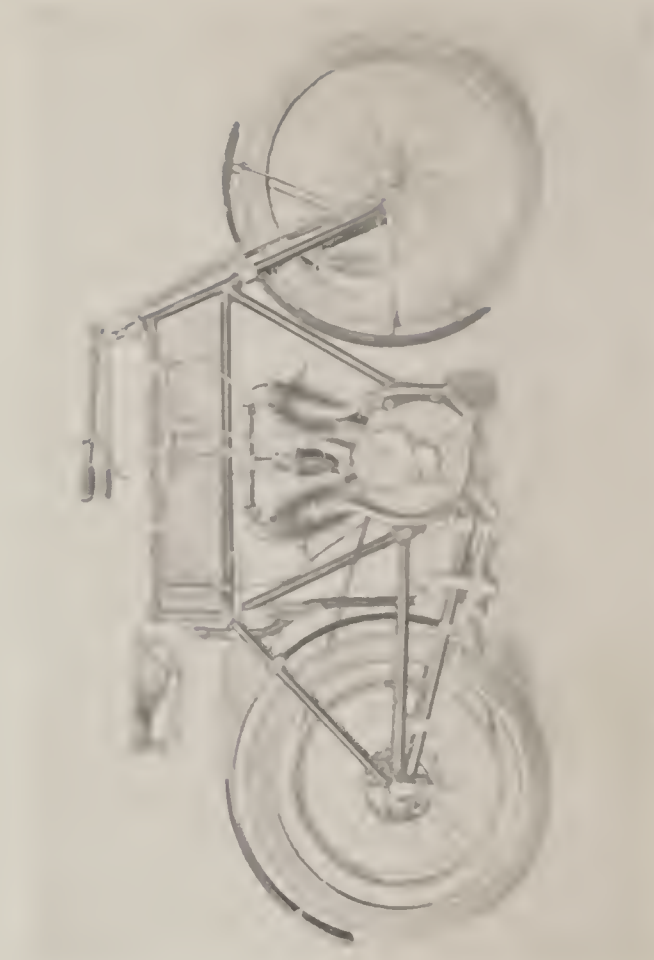
*Photo lent by "Motor Cycle,"*  
**The Hildebrand & Wolfmüller Bicycle.**  
 (One of the first motor-bicycles made.)



*Photo lent by "Motor Cycle,"*  
**The Hildebrand & Wolfmüller Bicycle.**



**The Triumph.**  
 A good example of the single cylinder motor-bicycle.



**The Bat Twin Cylinder Motor-bicycle.**  
 (One of the first motor-bicycles made.)



the tests were not very satisfactory and were brought to a conclusion by a fire in the carburettor. This apparently frightened off any prospective buyers, and nothing more was done with it—although Colonel Holden, seeking to remove the defects of a direct drive with a two-cylinder motor, constructed a bicycle on somewhat similar lines but with a four-cylinder engine. An improvement, certainly, but not sufficiently so to make the type really successful. A few were manufactured and sold, one even attempting to complete the opening run to Brighton on Emancipation Day; but the pattern was wrong and soon died a natural death.

Previous to the advent of the motor-bicycle in England, Count De Dion had been experimenting with motor-tricycles in Paris. His early attempt with steam as motive power showed him the necessity of the abolition of the steam boiler if success were to be won. He turned his attention to the internal combustion engine, and produced the De Dion tricycle, fitted with a petrol motor of a design that has been universally copied by the makers of all air-cooled cycle-motors, and even to the present day is difficult to beat for all-round efficiency. These early De Dion tricycles proved themselves the first really practical motor-cycles; and in spite of their low power, about  $1\frac{1}{4}$  h.p., they were capable, with pedal assistance, of a very fair speed. Owing to the very low engine gear, about nine to one, they would climb hills better than one would expect; but the sheltered position of the engine at the rear of the rider did not conduce to efficient cooling, and overheating was a too prevalent complaint. The power of the engine was afterwards increased and a forecarriage fitted to carry a passenger, converting the machine into a four-wheeled vehicle; but the original defects still remained, and, although some are still in use at the present time, proving that this type of machine was capable of useful service, the pattern has long been extinct.

About the time that De Dion was perfecting his petrol-driven tricycle, another inventor, Leon Bollée, was busy on very similar lines to those employed by makers of the



modern tricar, and the tandem tricycles of his make proved the fastest of all the various machines taking part in the opening run to Brighton.

Whether these original Bollée tricycles should be properly classed as motor-cycles or cars must to a great extent be a matter of opinion. In any case they were very ingenious machines fitted with change-speed gear, and belt-driving which could be made to do duty as a clutch by slackening the belt. The air-cooled motor was powerful enough, but they suffered from overheating caused both by the position of the motor and the method of igniting the charge with a hot tube, kept at a red heat by means of a blow-lamp. In addition to mechanical troubles this pattern of machine appeared far more prone to side-slip than the modern tricar. It enjoyed but brief favour; and being a difficult machine to drive, probably suffered from the incompetence of its owners, who blamed it rather than their own inability to control an air-cooled engine.

Following the failure of the early direct-driven motor-bicycle, the single-track machine remained under a cloud for a short time, until Messrs. Werner introduced their early models fitted with a neat little motor clipped on the handle-bars and front forks of an ordinary pattern bicycle. This was driven by a belt to a rim on the front wheel of the machine. It was undoubtedly the substitution of the belt for the more positive means of driving by chain and gear wheels, which permitted the necessary slip and elasticity to make this machine a success. It had its faults, but it was a practical thing, and upon the later types, with electrical ignition, many good rides were performed.

Contemporary with the later days of the front-driven motor-bicycle, Minerva Motors of Antwerp brought out a small complete motor—set for clipping on the down tube of a standard pattern roadster bicycle with a belt-drive to the rear wheel. This innovation may be said to mark the era of the modern motor-bicycle—the combination of an engine hung low down in the centre of the frame, tank suspended from the top tube, and a plain belt-drive to rear wheel. Although almost

toy-like in dimensions, and of feeble power, say  $\frac{3}{4}$  h.p. at best, the machine was practical and met with instant success.

A small boom took place in motor-cycles. Many and sundry patterns were introduced, of which probably Singer's machine, with a complete motor set in the rear wheel, was the most distinctive. But nearly every maker of push-cycles either introduced a pattern of his own or bought an engine and slung it in any convenient position of the frame on one of his standard pattern bicycles.

Many weird and wonderful "contraptions" made their appearance—in addition to designs of real merit, such as the Phelon and Moore bicycles of Messrs. Humber & Co., a pattern still successfully marketed by the inventors, and the worm-driven machine invented by Starley (not now made). The result of this boom had the natural effect—it put the sport in a bad odour. Those who invested in the experimental machines found themselves saddled with badly built and still worse designed "crocks" which were a constant source of trouble; and to make matters worse, the local cycle man, rejoicing in the newly found calling of "motor expert," was utterly incompetent in the majority of cases to put right the most trivial derangements.

Disgusted with machines which spent more time in the workshop than on the road, many riders either gave them up or turned their attention to cars, and a slump speedily set in among motor-cycle manufacturers which, unfortunately, not only affected the makers of the indifferent types which had been the root of the trouble, but brought down as well several old-established manufacturers of the ordinary cycles who had embarked too deeply in the motor-cycle movement. At the same time, it caused others to drop the manufacture of motor-propelled cycles with undignified celerity. But this clearing of the air, both among riders and makers of motor-cycles, has not been an unmixed evil. In the trade it has done a lot of good—the fittest have survived; instead of the ugly high-built machine of a couple of years ago, we have now the modern motor-bicycle, low-built, safe on greasy roads, comfortable to ride, and capable of taking the severest grades at a speed

only excelled by the most powerful cars. Moreover, it is a reliable mount, running for a thousand miles or more with hardly an adjustment.

Even among riders the weeding-out process has done good. A motor-cyclist has to be his own chauffeur, and the man who is incompetent to effect a roadside repair or adjustment is out of place on a motor-cycle. He should buy a car and hire a man to drive it for him.



## CHAPTER XXVIII

### THE CHOICE OF A MOTOR-CYCLE

TO a rich man the necessary sum to purchase one of the best motor-bicycles is not of much consequence, and whether it be wisely laid out or the reverse is of small moment. But in the majority of cases, the prospective owner of a motor-cycle is a man who, when he invests fifty pounds, wants good value for his money. The old adage that experience has to be paid for still holds good: but the wise man profits as much as he can by the experience for which *others* have paid. In giving my advice as to the choice of a machine, I can assure my readers that I have myself paid, in some instances, dearly for my own experience.

Before recommending a mount, it is necessary to know what particular service the rider will expect of it, and whether he is a complete novice, or an old hand. Is the machine wanted for comparatively short runs near home, or for serious touring, which may embrace all the most picturesque parts of the United Kingdom and the Continent? Lastly, is it to be used solely as a bicycle, or made to do double duty, with a side-car or forecarriage attached?

I will take the case of the complete novice first, and I will presume he is already well at home on the ordinary push-bicycle. Both for his own sake and that of others whom he may meet on the road, I should certainly never recommend any one to go in for motor-cycling without a fair experience as an ordinary cyclist.

Undoubtedly the best course a novice can pursue is to invest in a good second-hand machine, if he is in a position to assure himself that the mount he contemplates purchasing is in good condition, and is not a faked-up, worn-out old

“crock.” A second-hand motor-cycle is a most difficult machine of which to judge the condition. Fresh from the hands of a really skilful “faker,” nothing short of a detailed examination of the engine and bearings will disclose its actual condition, and when a second-hand mount is offered for inspection, it is unreasonable to expect the seller to pull it to pieces at the beck and call of every possible purchaser. For this reason the novice will do well to avoid such places as sale rooms, which abound with pitfalls for the unwary, and either to buy a machine from a friend who can give him its history, or to put his trust in a local dealer (if a reliable man) and secure one of the mounts which these men are always getting from their regular customers in part payment for later models.

When selecting a second-hand machine, the following are the principal points to be remembered: The bicycle portion of the machine should be examined, the front forks sighted to see that they have not been set back in collision, and the main frame tubes examined close to the head for the kinks, which generally follow a bad “pitch in.” By stooping down a sight can be taken of the plane of the two wheels, to see that they are in track, and that the frame has not been twisted by a spill. A glance from behind will show whether the belt rim is in a line with the engine pulley. Both wheels should then be revolved to see if they run truly. Notice at the same time if the belt rim be concentric with the rim of the wheel, or if there be any flat places in the wheels caused by striking obstacles when running fast. The buyer should next test the holding power of the brakes, and, when his examination of the cycle portion of the machine is thus completed, he will probably have found some defects, and will have to use his judgment as to their seriousness or otherwise. If defects are found all round it is a fair conclusion that the machine has had a bad time of it, and a machine with a frame or forks bearing evidence of a bad collision is, to my mind, untrustworthy. But a defective wheel or damaged rim is not an expensive item to replace, and may have been due to such a mishap as striking a

brick in the dark at speed, without in any way damaging the other part of the machine.

Supposing the bicycle portion passes this test, we now come to the crucial point of the state of the engine. Removing the belt and grasping the engine pulley firmly, test first for up-and-down shake. It should be quite firm in this direction, but a little end-play horizontally is allowable. Then test for play in the big end and gudgeon pin by revolving the pulley backwards and forwards at half stroke. If there is any appreciable slackness in these bearings, it will be easily felt, and is generally the cause of the engine knocking more or less badly, until it is repaired by rebushing.

The next thing is to remove the contact-breaker cover and see what state the firing cam is in. If the base plate of the contact breaker is a fairly firm fit on the crank case, it should revolve freely during its prescribed arc without being shaky. By getting hold of the firing cam and attempting to revolve it in either direction, one can get an idea of the amount of back lash in the two-to-one gears. The place to find the wear in these gears is just where the exhaust valve begins to open. Revolve the engine until the tappet is just lifting the valve, then remove the strain of the valve spring by lifting the valve with the exhaust-valve lifter and test. The next point in the examination is one which necessitates taking out the exhaust valve.

This is not a lengthy job, and should not be objected to by the seller, and it will teach much. The state of the valve alone will tell a tale. One can read from it if the engine has been continually allowed to run hot, a state of things which may arise through a variety of causes, such as bad driving, too rich a mixture, or a defect in the design of the engine itself. But the chief object of taking out the valve is to examine the seating, and to see that the previous owner has not ground it away to a depth which will prevent the head rising enough to afford that clear passage for the exhaust gases, without which no engine will keep cool. Make a point of examining the seat closely for small



cracks ; they are prone to occur at this point, and a defective exhaust-valve seating is beyond repair. It entails either a new cylinder head, or both cylinder head and cylinder if they happen to be cast in one piece, as is often the case.

After the engine has received attention, proceed to the ignition. If by a magneto, the best test will be as to the regularity with which it fires the charge. My experience of magnetos is that they deteriorate little in use. The transmission often wears, but it is not costly to replace, and as long as the magneto fires regularly there is not much wrong with it. If the machine is fitted with the ordinary high-tension system by coil and accumulator, the coil can be passed so long as it answers the test of firing properly. The accumulator can be judged by appearance alone by one used to the work, but the novice must be warned that if the plates appear covered with white deposit they are badly sulphated, and if he finds the terminals coated with green deposit, and the inside of the tank compartment holding the cells more or less covered with a similar coating, not unlike common salt, the acid has been leaking, and that cell or cells will be a nuisance.

So much for the detailed examination, which will occupy far less time than it has taken to describe. Now for the practical test. Let down the stand, get into the saddle, inject a fair dose of paraffin into the cylinder head, pedal the machine round briskly, with the exhaust valve lifted, and listen if the engine "knocks." Then give the engine a run under power for a few seconds ; but do not expect it to fire with regularity, or nicely, immediately after the paraffin, the object of which is to dissolve any extra thick oil which the seller may have carefully put in to avoid any knock, and to increase the compression. This latter can be tested by dropping the exhaust valve and putting the whole of one's weight on one pedal. If it is in good order, it should take fully ten seconds to force the engine over ; but I have known engines which would hold up for more than a minute, and, on the other hand, I have examined engines which pulled well,

although the compression was so poor that they would not support one's weight at all.

Supposing the machine to have answered all these tests in a satisfactory manner, there still remains what an experienced buyer would take first—a short trial on the road. As our buyer is a novice, this would convey little to him; but if there is a decent hill handy, and he can persuade the seller to show its paces up this, he will get a good idea of its capabilities; but he must remember that a machine which will romp up a stiff gradient with eight stone up will make a very different show with a twelve-stone rider, and possibly fail altogether, unless aided by vigorous pedalling, with a really heavy weight, or when pulling a trailer or side-car.

In giving these few hints as to the choice of a second-hand machine, my readers will have noticed that I have refrained from giving any advice as to choice of pattern or the power of the suitable machine. Advice on these points applies equally to new and second-hand machines, and by reading the following pages would-be purchasers should get a good idea of what will suit their requirements.

The choice offered to a motor-cyclist at the present time is a wide one. He has the option of investing in a machine varying in weight from 70 lb. to over 2 cwt., and fitted with an engine showing anything between  $1\frac{1}{4}$  and 8 h.-p. He may have a machine fitted with one, two, three, or four cylinders, with rigid or spring frame. He is offered the simplicity of a plain, single-gear belt drive, or, if he should prefer it, a chain-driven with or without free engine clutches, and many kinds of two-speed gears. If the novice is a man with plenty of money and a thirst for experimenting, he will be given plenty of opportunity of discovering the defects in patterns prematurely marketed, without sufficient experience by their vendors to disclose their defects.

When one is choosing a motor-cycle the individuality of its prospective owner is a feature not to be lost sight of. Some men, without a mechanical training, are born tinkers, with a natural mechanical genius which enables them patiently to tackle tricky adjustments and derive satisfaction from a

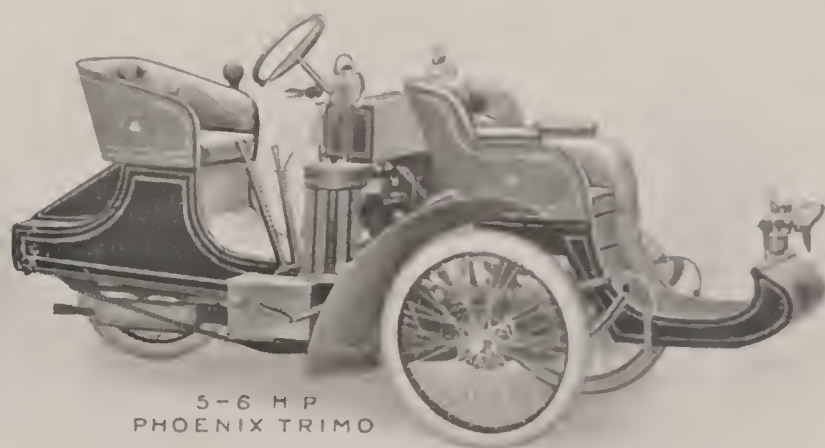
mount which, in other hands, would be condemned as "altogether too much trouble." To the first class of rider one can safely recommend any of the high-class twin-cylinder machines on the market (fitted with two-speed gear for certain classes of work), spring forks, and, if desired, spring frame. To the latter class of rider one cannot recommend too simple a design, but, preferably, it should be a plain single-cylinder machine, with magneto ignition and single-gear belt drive.

Now as to the weight and power of the machine. I myself have long been looking for the ideal light-weight, as ready and as handy as our old friend the push-bike ; but I have not yet found it. Light-weight motor-bicycles we have, such as the F.N., La Motosacoche, the N.S.U., and the Fairy. I have made personal trial of the second of these alone : but I have heard the F.N. well spoken of by riders, and have seen it perform creditably in hill climbs.

To the Motosacoche I have given a fair trial, and I must say that in the hands of a rider who does not mind assisting it with the pedals it is a very fair hill-climber, and quite capable of twenty-five miles an hour on the flat. The motor attachment, which is sold complete for affixing to any strong roadster machine, is beautifully made ; but to my fancy the bicycle portion of the complete machines might be much improved. Strange to say, the chief faults I found in this machine were undoubtedly caused by its light weight. I missed the easy, swinging motion of the heavy, powerful mount, and the absence of weight in the machine made it uncomfortable to ride faster than fifteen miles an hour over anything but the best roads. It was also certainly harder to start than many a 3 h.-p. I have ridden. Had I had the task of designing the bicycle portion, I think I could have turned out a more comfortable affair, even at the expense of an extra 10 lb. in weight. That this machine is a practical success is proved by the extent of its popularity on the Continent. Fitted with a very high pedalling gear and in the hands of a speed "merchant," I should expect some fine performances to be done on it.

Single-cylinder machines seem to be settling down to an





The Phoenix, a Medium-Weight Tricar with Water-cooled Engine.



Examples of Singer Bicycle with Engine in Rear Wheel.



average of  $3\frac{1}{2}$  h.p., as represented by cylinder dimensions of about 82-mm. bore by 88-mm. stroke, and a very useful size this is. It has sufficient power to convey a rider of twelve stone in weight, with, say, an extra two stone of luggage, over nearly every hill he is likely to meet on any road in regular use in the country. If fitted with a two-speed gear, it has ample power to do good work with a passenger attachment, when rider and passenger are not of the heavy-weight order. It is economical in petrol, easy to keep in order, and, in a hill-climbing contest, will often make a good fight with a "twin" of nearly double the power. It is, indeed, a sturdy champion, hard to beat either uphill or on the flat, and among its triumphs may be mentioned the Cycling Tourist Trophy Race of 1907.

For the rider who does not mind the trouble occasioned by keeping a pair of cylinders carefully tuned up to synchronise exactly, the twin-cylinder has many charms. Getting two impulses for one, it gives a very steady pull, and accelerates rapidly after a check on a hill. It is a grand machine to use for passenger work, and, with a pair of light-weight riders, say not over twenty stone in all, and a light passenger attachment, there are not many hills in ordinary country it will not take with a single gear, while its speed in a "policey" district is sufficient to entitle its driver to the maximum penalty every time he falls into the clutches of the law. But it has its drawbacks—it consumes double the electricity, and more petrol than a single-cylinder machine, and if it be not in perfect order it is a most indifferent performer. One cylinder of a pair firing late, or with a weak inlet spring, will have a most amazing effect. There are also a double set of ignition points to be kept adjusted in exact relation to one another. Lastly, many twins have given trouble from defective lubrication either in one or the other cylinder, and from this arises the sister fault of overheating, especially of the rear cylinder, which is of course shielded to a certain extent by the front one. It is only quite recently that makers have discovered the correct method of coupling up the inlet pipes to the carburettor, so as to ensure an even



supply of gas to each cylinder. There is no doubt that as we progress, the later pattern twins will be much less trouble than the earlier ones have been. The twin-cylinder machine has undoubtedly an advantage over the single in theory, and should prove eventually its superiority in practice ; but it is not the machine for the lazy rider, who objects to spend the necessary time to keep it in order.

Three-cylinder machines are at present almost non-existent ; a few experimental ones have been made, with what success I cannot say ; but as they are not a marketable commodity their claims do not interest the ordinary buyer.

Four-cylinders have now been with us some time. The first I recollect seeing was the invention of Mr. Charles Binks, and he read a very instructive paper on this type before the Institute of Cycle and Motor Engineers. With the early four-cylinder machine the great difficulty was that the extra friction of the four cylinders, added to the great loss of power by heat radiation to the cylinder walls, consumed the bulk of the available power. With larger cylinders this has been overcome to a great extent, but there is still another fault of troublesome nature. If driven throttled down, the suction draws up the lubricating oil past the piston-rings, and this fouls the sparking-plugs. With some machines this has been a most persistent fault ; but recently I have heard much better accounts of the late patterns, and I have seen them doing good work on the road. The noise of the exhaust on this type of machine is quite distinct from anything else. At a distance it sounds like the hum of an electric motor, while at close quarters it is far too pronounced to render riding in its company pleasant. All the extra trouble of a twin, as compared with a single, is of course doubled with this pattern, and it wants much care to keep it in good tune.

When the rider has settled to his own satisfaction the relative merits of single versus multi cylinder he will be confronted with what a year or two ago was a vexed question—the respective claims of a belt- or chain-driven machine. If he follows popular opinion, there is only one answer to this question, for fully 99 per cent. of the machines

now made are fitted with belt driving, and I myself prefer it to any other system I have tried. It has faults, not a few, but in spite of these it is the simplest and kindest drive I know for a bicycle or light tricar. The very hum of the chain is harassing, and when it is even a fraction out of pitch it sends a tremor through the whole machine. It also entails the complication of an extra countershaft and clutch to moderate the fierceness of its drive.

There are, certainly, one or two patterns of successful chain-drivers on the market. Of these the Phelon and Moore is the best known. This machine, aided by a most successful two-speed gear, has done well in many competitions, and has many satisfied patrons; but nevertheless the belt remains the favourite, although it is only quite recently that belt driving has become properly understood by the trade. Even in the year 1905 manufacturers were sending out both pulleys and belt rims at any angle which struck their fancy, often far removed from the  $28^{\circ}$  which we now look upon as the standard. The belt manufacturers themselves were uncertain as to the angle to which to cut their belts, many of these being cut as obtuse as  $40^{\circ}$ . The consequence was that belts seldom fitted either pulley or belt rim, and unless they were excessively tight they never drove efficiently.

Many riders had most exasperating experiences until Messrs. Ormerod, of Rochdale, brought out the Watawata belt, and impressed upon its users the necessity of accuracy of angle in pulleys and belt rims, with sufficient depth of groove to prevent bottoming. The Watawata was the first really flexible belt on the market, and as a fine-weather belt it is perfect. It will pull when dead slack, and allow sufficient imperceptible slip to neutralise the thud of the engine at slow speed; but, being a leather belt, it is unfair to expect it to stand day after day in wet weather without attention, and this is what a rubber belt will do, upon which account I recommend riders to sport a couple of belts, and when they get their leather belt wet, take it off, well oil it with cylinder oil, and give it a rest for a day to dry. As prevention is better than cure, it is better to avoid getting a leather belt

saturated by using in its stead a rubber one in bad weather. This will save the messy job of belt cleaning.

The diameter of the belt should be proportioned to the power of the engine. A belt three-quarters of an inch wide, in either rubber or good leather, will transmit 3 h.p. nicely. Seven-eighths answers well up to  $4\frac{1}{2}$  h.p.; above this power it is advisable to use an inch belt. While on the subject of belts a word on the belt-fastener will be appropriate. There are many of these on the market, and they are generally effective; but, so far, only a few have been brought out which permit of the belt being unhooked. I look upon a hook-fastener as a real comfort, for a variety of reasons. It much facilitates repairs to the belt, as they can be done away from the machine in the most convenient spot, say on the nearest gate-post, and under shelter if it be raining. It enables the rider, to a certain extent, to safeguard the machine against unauthorised use or theft when he has occasion to leave it in a garage or against a fence while he has a look at the country. Lastly, by using a belt with two fasteners, and a short inserted piece of about a foot, one can readily shorten it without delay on the roadside by exchanging this piece for one half an inch shorter which can be carried in the tool bag. The rider in this case should, at a favourable opportunity, take an inch out of the piece removed, and when this is again exchanged it will effect a shortening of another half-inch in the belt. The actual time of shortening a belt by this means is about thirty seconds, and the saving in discomfort in the dark, or when it is raining, is a thing to be appreciated.

Down to the present time the majority of motor-bicycles have been fitted with a single gear, and the general adaptation of the two-speed or variable gears has been a matter of discussion which has waxed fierce in that bright little paper devoted to the interest of the sport, *The Motor-cycle*, and has been deemed worthy of a special discussion by the Auto Cycle Club. Taken all round, the general consensus of opinion is that a good two-speed gear is a valuable adjunct on any touring bicycle, and a necessity on any passenger machine.



in hilly parts of the country. Of course, very good work can be done on a single gear, and if one has a powerful mount it will not be often that the need of the extra power will be felt on hills ; but all of us know how difficult it is to tackle even moderately stiff hills in towns, or to comply with the law on such hills as Guildford High Street, or Holywell Hill, St. Albans, where the ten-mile limit is in force, and it is in circumstances like these that the two-speed scores. The objections urged against the general adaptation of the principle to all machines are primarily, the additional first cost, about £10 on the average ; secondly, the extra weight ; and lastly, the increased complication and liability to derangement. The first is a weighty objection to many buyers ; but in my opinion the money is well spent. The second hardly counts, in view of the increased power available ; and the third, although very true at present, is a matter which time will speedily put right, as experience points out the weak spots in the various gears.

At the present moment it is an invidious task to single out any particular pattern of gear, but if the rider does not object to a chain-drive both the Phelon and Moore and Anglian gears are proved contrivances, well out of the experimental stage. There are also the Phoenix Two-Speed Hub and several geared pulleys, the latter rather new comers, promising in theory, but not sufficiently well known to warrant any expression of opinion as to their capabilities.

In addition to means of varying the gear by gearing, this can also be done by contracting and expanding the engine pulley ; and although I myself have invented a pulley on this plan, giving a variety of gears, I am not in love with it as a variable gear while riding, as it necessitates the use of a jockey pulley ; but as a means of altering the gear for a time, a pulley with adjustable flanges is a great boon, and should eventually become part of standard equipment of all high-class machines. The free-engine clutch, without the addition of a two-speed gear, I look upon as a useless complication. One does not expect a powerful car to restart on a stiff hill on the top gear, neither can we expect a cycle engine to do it, and

these are the only circumstances under which I shall expect a free engine to be an advantage.

The relative claims of magneto and battery ignition needs in my opinion but little discussion. Both are capable of giving equally good results as regards power and reliability, but as a saver of trouble the magneto is well worth the extra price charged for it. Not only does it relieve one of the trouble of keeping the accumulators charged and in good condition, but it entirely removes any chances of being stranded owing to the unexpected short circuit running the battery down.

With regard to the cycle portion of the machine care should be taken to see that the frame is sufficiently low to enable the rider to sit comfortably on the saddle with his feet resting on the ground. If he is going in for a machine with two-speed gear, pedals may be dispensed with; but on a single-gear mount they are of decided advantage, and friends in need in a tight corner. Spring-forks I look upon as an absolute necessity. Owing to the growth of all kinds of traffic the roads are everywhere deteriorating, and to cycle in comfort in the near future one will have to use a machine sprung fore and aft. In any case where there is room for it, a good spring-seat pillar, used in combination with spring-forks, goes far to mitigate the evils of those atrocious surfaces to be found in many towns nowadays.

## CHAPTER XXIX

### HOW TO KEEP A MACHINE IN ORDER

A GOOD motor-bicycle in perfect condition is a constant source of enjoyment to its owner ; but if it be neglected, and the few necessary adjustments and repairs left undone, that same machine will develop into a nuisance of the first order. From the very perversity of things in general it is certain to choose the most inconvenient times and places to break down. In reality very little care is necessary to keep a good machine in order. The great thing is to anticipate breakdowns by detaching worn or weak parts and replacing them at home, at one's leisure, instead of leaving them to fail at the most inopportune moment. My advice to all users of motor-cycles is never to tempt Providence.

Do not venture far afield with tyres having weak places. If the engine pulley is worn, and the belt is in danger of "bottoming," remember that the day is not far distant when it will slip on every slight incline. No amount of tightening will effect a permanent cure, and at last that belt will be destroyed through being run at too great a tension. To trust to an accumulator in an almost discharged condition is another certain means of getting "hung up," and lastly, to venture out with brakes destitute of stopping power is simply criminal folly. The wise rider takes care of all these points and many others, and so safeguards himself as far as possible against involuntary stops ; but there are some mishaps which none can guard against, and these have to be diagnosed and made good on the spot, if one wishes to be saved the ignominy of a return by train.

Tyre repairs, as the most common failings, naturally come first ; but as the process of repairing pneumatic tyres is now



so well known, little need be said on this subject beyond reminding readers that motor-cycle tyres require much more thoroughly repairing than those on ordinary push-cycles. The patches used must be larger, the surface of both patch and tube must be carefully cleaned with coarse sand-paper, the solution must be good and thickly applied, and lastly, the job must not be hurried. *The solution should be quite set before the patch is applied.* Properly done, I have found repairs without vulcanising quite satisfactory, but the process takes time, half an hour on a warm day and longer in cold weather, and for this reason butted air-tubes are coming into favour. From experience of those made on Rich's patent plan I can answer for their efficiency. They hold air very well, and it is a great comfort to be able to remove a tube for repair without taking out the wheel. When a spare tube is carried, it can be readily exchanged and the punctured tube repaired at a convenient time. The extra cost of these tubes is only 2s. 6d. and old ones in good condition can be converted at a low price. This invention much lightens the labour of tyre repairs in the rear wheels of both bicycles and tricars.

Repairs to outer covers can only be permanently effected by vulcanising, and even then they are rarely reliable. It is much cheaper in the end to discard old covers which have been seriously damaged. If one is left on until it bursts, a good air-tube may be ruined, a holiday spoilt, and perhaps a substantial railway fare incurred. Small deep cuts in covers can be repaired with "Pneucure," and, if it be carefully applied in accordance with the directions, this stopping is good for a thousand miles or more. It effectually prevents wet getting access to the canvas, and it is the damp which does the damage ; it rots the fabric and a burst follows. A cut in the cover made by the edge of the rim is beyond permanent repair. It can be temporarily patched up by a strip of canvas solutioned completely round both beads inside the cover, and this will take the rider home ; but this is about all it will do.

Following tyres, the electrical equipment undoubtedly is

responsible for more trouble than any other portion of the mechanism, and much of this trouble is preventable. Electricity is a tricky power; even the most advanced scientists are ignorant as to what it really is. We know many of its effects, and some of the laws which govern it; but much more remains yet to be learnt. If this be the case with the learned specialists, the inexperienced motor-cyclist may be excused his very superficial knowledge. According to the poet "a little learning is a dangerous thing," but the motor-cyclist will find a very elementary acquaintance with electrical matters of much practical use. When he has mastered the fundamental laws governing the use of electricity, he will have far less difficulty in overcoming the otherwise perplexing troubles connected with ignition.

Take the case of the ordinary high-tension current, furnished by coil and accumulator to begin with, as this is the most commonly used. I will ask, What is the most frequent cause of trouble? To this the answer is: Exhausted accumulators. Why? Simply because riders take them on trust, and appear to think they will hold their charge indefinitely. Generally speaking, however, there is very little power left in an accumulator after standing a month, even when not in use. The current commences leaking away the moment charging finishes, slowly certainly, but surely, until after a time, although a cell may still show 3·9 or 4 on a voltmeter, there is but little useful energy left in it. The best way to judge a cycle accumulator is by the eye. The colour of the plates will be a good indication of the state they are in. The positive plates should be a rich dark chocolate, the negatives a lead colour. Any white deposit is simply sulphate of lead, which forms on the plates from neglect. It has the effect of reducing the capacity of the cell to a considerable extent. It can sometimes be got rid of by long slow charging, repeated several times, the cells having been discharged through a resistance between each charging.

The golden rule for keeping accumulators in order is to have them regularly charged, at least once a month. When

it is possible, the charging should be done slowly. Half an ampere of current, put through what is called a twenty ampere-hour cell for twenty-four hours, will give a more lasting charge than a heavier current for a proportionately shorter time. The terminals of all cells should always be kept clean and coated with vaseline. If one gets corroded, and the nut cannot be unscrewed easily, do not risk twisting it off with the pliers; just warm it with a hot poker until the green corrosive matter is seen to melt. It will come off quite easily then. Do not touch the celluloid case with the hot poker, unless you wish to see how fiercely the stuff burns.

If the case leaks, it can be readily repaired by soaking a bit of celluloid in acetone and applying it like a patch to a tyre. If at any time a piece of paste from the plates falls out and is likely to cause a short circuit by forming a bridge between two of them, lay the cell on its side so that the loose piece is uppermost, take a sharp penknife, cut a hole in the celluloid case just over the offending matter, and remove it with a pair of tweezers, then cement a piece of celluloid over the hole. This plan avoids the risk of raking about with wire through the vent holes and can be done very quickly—say in thirty minutes altogether.

To calculate how far an accumulator should run, firstly reckon how long since it was charged, and deduct 15 per cent. per week for time loss only, then, with an economical coil, reckon it out at the rate of seven hundred miles from a twenty-ampere accumulator freshly charged for a single cylinder machine travelling at ordinary touring pace. The consumption of electricity depends on the time the machine is running and not on the distance run; hence the slower one travels the more electricity is consumed over a given distance. A "twin" will of course take double the current.

Supposing the accumulator is in good order, the other essential points to look after are, firstly, the wiring from battery to coil, contact-breaker, and switch. See that not a bit more wire than necessary is used. The less you have the less there is to keep in order, and the smaller the chance





*Photo by Campbell-Gray.*

Mr. S. F. Edge.



of a break either in the core or insulating covering. If you wish to avoid trouble, use only the best wire, avoiding any slipshod work in running it. Proper terminal eyes should be employed, carefully soldered with resin or fluxite to ensure good permanent electrical connections. To prevent possible short circuits, protect the insulating covering against fraying by binding with tape and waxed thread any places where it emerges through an opening in the tank or contact-breaker cover.

Look with suspicion on all switches, they are a fruitful source of annoyance, often unsuspected. Personally, I have had so much trouble with them that I have reluctantly abandoned them altogether. By making the interrupter plug (Touche) with an insulating bottom, it can be used to cut off the current when the engine is not in use down long slopes by simply pulling it up a bit; a pat of the hand immediately putting it into action again. Riders who have switches should avoid driving on them. This method of control invariably causes loud silencer reports, which are disconcerting to other traffic and bring the whole sport into disrepute.

Coils, if of the plain variety, give little trouble, for there is nothing to wear out in them. The trembler coil facilitates starting, and the buzz of the trembler at once shows if the ignition is in order. This type of coil entails the care of an extra pair of points which must be adjusted occasionally—and the make-and-break must be set to give a slightly longer contact. It is not quite so fast at high speeds, but fires the charge well when running slowly, and for this reason is more in favour with tourists than racing men. When it is necessary to adjust it, trim up the platinum points with a fine file, couple up to an accumulator, and, using one wire as a make-and-break, adjust the screw so that the trembler vibrates with the most momentary contact you can give. To prevent damage to the insulation, earth the high-tension terminal with a piece of wire. This precaution may also save the operator from unexpected shocks, with very probably involuntary exclamations appropriate to the occasion.



The make-and-break on the engine varies with different manufacturers, and it is the place where one first looks for trouble. The general fault is that the points get burnt up, or if a wipe be employed an imperfect and unreliable contact is made. Taking the latter style first, I may say that it has never been a favourite of mine, but it can be made to work well if the brass segment stands up well above the fibre disc. If worn, it should be repaired either by replacing entirely the wiper blade and disc as a permanent repair, or temporarily by cutting away the fibre to allow the brass to stand higher.

With a positive make-and-break the platinum points should be filed quite flat and set with the machine running on a stand under power to give the minimum contact necessary to fire regularly at high speeds. It is false economy to try to trim points with a hammer and punch as is sometimes recommended. It is certain to distort them and very likely to upset the screw or perhaps crack the trembler blade. One prolific cause of trouble with any kind of make-and-break is dust. The covers fitted are too frequently shoddy affairs, neither oil nor dust-tight, and it only wants one particle of flint between the points to pull the engine up. With a good tight-fitting cover it is possible to run either a wipe or make-and-break in an oil-bath thereby much prolonging its life. Some riders dispense with a cover altogether ; but my experience of these men is that they seldom do any distance without repeated ignition troubles.

The most frequent actual breakdown in the make-and-break is the trembler blade ; so that a spare blade should always be carried. In an emergency a plain piece of clock spring can be used, or a strip of German silver or aluminium. To make these two latter hard and springy they should be well hammered before use. There is nothing so good as pure platinum for points, especially if it be faced with iridium, and if a machine burns these up the fault is with the condenser of the coil or a faulty connection in the wiring. I have found it an advantage to wire up the coil from the battery on the earth circuit instead of *via* the make-and-

break ; this prevents the high-tension spark travelling across the points and helping to destroy them.

Sparkign-plugs are fickle friends. Often one lasts a tremendous time, and is followed by several with very short lives. A plug has more effect on pace than is generally supposed, and for this reason choose one with points projecting well away from the base. A plug with a cracked porcelain will fire well with the throttle nearly closed, but miss badly as soon as one has to open out on a hill. By remembering this much useless examination and testing of other parts may be avoided. It does not pay to repair plugs, nor does it pay to buy the cheap and nasty kind when a good one like the "E. I. C." will frequently last several years. One point to remember before putting a plug into the valise as a spare, is to make sure that the thread is not too full to screw home easily in the cylinder. Unfortunately this is a common fault even with the best plugs, and the result of screwing home with a big spanner a tight plug in a hot cylinder is that it will be very difficult to get out and may entail a visit to an engineering shop. If a tight plug has to be used, pack it up with copper washers so that it only enters about three or four threads. To remove a tight plug, apply plenty of paraffin round the base, and if possible round the thread inside the cylinder, through one of the valve pockets. Run the engine to warm it up, or, if this is no longer possible, apply the flame of a blow-pipe, or even burning waste and paraffin, to the cylinder. Get a firm grip with a good spanner and pull steadily. If it does not move, try a few smart pats with a *light* hammer and chisel, and again pull. If the top twists off, get a good workman to drill the plug out with a pin-drill and clean out the thread with a tap. With care in the selection of plugs, this should never happen, but, to my knowledge, much trouble and not a few cracked cylinders have been caused by tight plugs.

With regard to the modern form of high-tension ignition by magneto, little need be said. My experience of it has been such that I have had no opportunity of displaying my skill in effecting repairs. I have worn out the transmission

gear by fair wear-and-tear, and after long use have had to replace a fibre cam. Barring accidents, all that the average rider will have to do to his magneto is occasionally to clean the carbon brushes and take care that the points are set so that they give a minimum brake, and, when touching, are trimmed so as to give a big flat surface of contact. If they start burning up it is the result of a bad contact, and may be that the brass cover does not fit tight enough, or that the carbon is not clean and wants nicely scraping.

The magnets are supposed to last three years without requiring remagnetising. In many cases they will last longer, but the rider must never remove the armature of his magneto without at once replacing it with an iron core of the same size. The foreman at the Simms' works is most impressive on this point; he says it is only a question of seconds to reduce the magnetism seriously. Although I cannot corroborate or disprove this statement, it is as well to be on the safe side by following the advice of those who should know. I need not remind readers that a magneto, like any other rapidly revolving machinery, requires properly oiling, and the reservoir should be filled every three hundred miles, and the wicks occasionally removed and washed in petrol to clean them.

When using magneto ignition the points of the sparking-plug must be set very close, say just sufficiently far apart to admit a thin visiting-card. If set open, the machine will start badly. When running at a normal speed the spark given by a magneto is both hot and large, and consequently destructive to plugs unless they are made with heavy points. For this reason the owner of a machine fired by magneto should take care to use only plugs made especially for this style of ignition.

The carburettor, if properly set by the makers, should not often give trouble. Occasionally, of course, the jet will get choked by a particle of grit, or water will get mixed with the petrol. Either of these will either stop the engine or cause erratic running. When cleaning the jet care must be exercised not to enlarge it. Should this be done by accident,



the hole can be closed by a few gentle taps of a very light hammer. If the closing process is overdone—and it is very difficult to avoid this—correct it with a needle of the requisite thickness.

Petrol and oil pipes occasionally break from vibration, or come adrift from their unions. If this happens on a journey a temporary repair can be effected with an india-rubber tube, and if necessary that on the acetylene lamp can be pressed into service. Seccotine, a kind of fish glue, is proof against petrol, and a repair effected with tape well soaked with this material will last quite a long time. The rider should not omit to have any failings in any of the petrol connections repaired in a permanent manner at the earliest opportunity. Neglect may result in a total loss of the machine by fire.

The mechanical parts of the engine seldom give trouble, and when they do it is in many cases a workshop job. Excluding the valves, the most common source of badly damaged engines has been the grub screws employed to secure the gudgeon pin in the piston. Once these get a trifle slack, nothing will prevent their working out and falling into the crank-case.

If they miss getting pinched between the piston and crank-case, they soon make their unwelcome presence known in some other equally disastrous direction, and for this reason I strongly recommend every rider to dispense with them. There are other ways of fixing the gudgeon pin without risk in a perfectly secure manner. For instance, a longitudinal key at one end holds it well. It can be made a good fit and driven in, with a couple of brass plugs to prevent it working out and scoring the cylinder, or an extra piston ring to cover the ends will answer the same purpose.

The piston rings should last at least ten thousand miles when the top one will be found slack sideways in the groove and should be replaced by a new one, a trifle wider. If a lathe is handy, just face the groove out to remove any ridges; failing this, rub down the new ring on a sheet of emery cloth until it just enters the groove easily but without play.

Piston rings can be taken out or replaced by working four or five bits of tin under them from the slots. Being cast iron, any unskilful handling will snap them like glass. New rings seldom give good compression at first. They want running in, and the rider must be liberal with the oil for a little time afterwards. The advice as to placing the slots at an angle of  $120^\circ$ , while correct in theory, is not much use in practice, as the rings, not being pinned, are constantly turning round in the grooves.

The valves are two working parts of the engine which must be kept in order. Any leakage is fatal to efficiency. The amount of compression is a good guide as to the state of the valves: even if this remain good they should be taken out about every thousand miles, their stems cleaned, and before replacing ground into their seats with 220 emery. There is no occasion to overdo the grinding-in process: all that is required is to make them gastight, and once they touch all round this is enough. After long use the stem of the exhaust valve may require a bit brazing on to it, while the inlet valve will want a new cotter if it opens too much. The rider should always carry a spare valve to fit both exhaust and inlet, and they should have been cut to length and tested for fit at home. It is not often that valves fail unless the rider is a hard driver or the material is at fault, but without a spare valve the rider is completely disabled in case of failure. A pair of valve springs is also an essential part of the kit. That intended for the exhaust valve should err on the side of stiffness, and the inlet valve springs should be as near the correct tension as possible. For an automatic inlet valve of  $1\frac{1}{4}$ -in. diameter a spring opening at 16 oz., rising to 24 oz. when fully open, with  $\frac{1}{8}$  in. lift will be about right. When a twin cylinder machine is used the rider must take care that both inlet valve springs are of equal tension, if he wants both cylinders to do their best. This is easily ascertained by pressing them together and noticing which valve leaves its seat first. When a spring is too strong, a coil or two can be cut off, until the correct tension is obtained. Although an

apparently unimportant little fitting, a correctly proportioned inlet valve spring is essential when automatic valves are used. Let the rider test for himself the difference a few ounces in the tension of the spring will make. He will learn much.

The timing of an engine, by which is meant the point in each revolution when the valves open and shut and the charge is fired, is a subject which must be understood to comprehend the working of an engine on the Otto Cycle. As this principle is now well known I need only give a few hints as to assembling an engine which has been taken down for cleaning or repairs. As a rule the two-to-one gears are marked to show the position in which to reassemble the parts. Failing these marks, or in cases where they are indistinct, set the gear wheel driving the exhaust cam so that this valve opens at about seven-eighths of the firing stroke, and closes just as the piston reaches the top of the exhaust stroke. If the inlet valve is a mechanical one, set this to open at the commencement of the suction stroke and to close at the top, or just after. For high speeds late opening and late closing are an advantage in inlet valves of the mechanical variety. The firing cam must be set to fire exactly at the top of the stroke when the lever for advancing and retarding the ignition is about one third advanced. When setting a firing cam, remember that a plain coil fires on the break and a trembler at the commencement of the make. If the firing is set too far advanced, it not only renders starting uncertain, but makes riding at a slow pace difficult.

In concluding this chapter on the care of a motor-bicycle, let me urge upon my readers not to entrust a valuable machine to the tender mercies of the first individual styling himself a motor repairer whose shop is encountered. Unfortunately, only a few of these men are workmen, and the good ones are few and far between. Rather rely upon yourself for minor repairs, and when something beyond your capacity turns up, send the machine to a man with a properly equipped workshop. The bungler with a few tools, all more or less blunt and partly worn out, will do more damage in a few minutes than he is capable of repairing in a month.



## CHAPTER XXX

### ON THE ROAD

OUR good old friend the push-bicycle did much to annihilate distance ; but to get the most out of it one had to be in condition, and adverse circumstances, such as a head wind or heavy roads, greatly marred enjoyment. With the motor-cycle these are merely incidents in the day's run. A trifle more throttle, and the sturdy little engine, rising to the occasion, drives its proud possessor over hill and dale, unrolling the scenery to his gaze. The long hills, which used to be such *bêtes noires* when the rider was a bit fagged, are hardly noticed. The machine takes them in its stride, and when a veritable mountain is struck, such as Westerham or Birdlip, it is simply a test of the driver's skill and the condition of his mount. Properly tuned up, a good 3½-h.p. single-cylinder or 5-h.p. twin will devour these ascents at a pace that would take a 60-h.p. car all its work to equal.

On the flat the cycle cannot live with the car ; but up steep hills only the highest-powered racing-cars can approach bicycle speed. The reason why the bicycle makes such a poor show on the level is not that it is in itself so much inferior in point of speed, but is due to the inability of the rider to retain control of the machine at high speeds over anything but the best surfaces. The heavy, well-sprung car bounds over the rough places with but little discomfort to those on board, whereas the motor-cyclist finds his front wheel leaving the road, and has to moderate his pace, but at the end of the day's run his average will not be indifferent.

Many a day on long runs have I kept in company with good cars, passing them on rises, to be repassed in turn

down long slopes, and often to finish up at the same hotel in the evening.

To those whose leisure is limited, the motor-cycle opens up a field quite unattainable to pedal-propelled cyclists. None but a trained athlete would care for a ride of a hundred miles or more on a pedal cycle after tea, yet this is a distance that a young motor-cyclist I know repeatedly performs when his week's work is done on a Friday night. This man uses his machine as an aid to business, and finds in sparsely populated districts he can cover three times as much ground as he could by train. As the pioneer motor-cyclist in my own district, I have made many converts, among whom I count a baker, who daily puffs round on an old Minerva, with a massive basket laden with loaves for customers too far off to be reached by cart. Another discarded mount of mine carries a plumber and his weighty tackle many miles a week. These instances show that there is practical service as well as enjoyment to be got from the motor-cycle. If the rider be fond of sport it is a rare aid. Only the favoured few have shooting and fishing at their own doors. Even when living in the country the scene of sport is often a considerable distance. In winter, Saturday afternoons are short, and every minute is of consequence; but if my gun and cartridges are laid out ready, the motor-bicycle takes me to my destination with little delay. It is the same in the angler's case. I have had many an evening hour on a stream seventeen miles off, which I should otherwise have missed. When I can spare a day I often go as far as fifty miles away. Many of these runs could not be done by train in the time, the lack of proper connections on cross-country routes would forbid them.

In addition to comparatively short-distance work, a motor-cyclist can transport himself and his luggage over large tracts of country. Land's End is an easy two-days' run from London, and a week will land one in John o' Groats, with ample opportunity to inspect the objects of interest *en route*. If an affiliated member of the Auto Cycle Club, a permit can be got for asking, passing one free through foreign Customs,

when France, Germany, and Austria are open for exploration. Even a short holiday will suffice for a trip across France to the Pyrenees with a return home by sea from Bordeaux.

Spain at present offers opportunities to those with powerful mounts and an adventurous spirit. The country, so far, is little known to motor-cyclists, and the roads are indifferent and hilly, but there is much fun in venturing the unknown. For travelling off the beaten track in uncivilised Europe, a machine with a magneto is to be preferred ; and, although such a thing is seldom wanted, the rider might feel more comfortable if he added some kind of defensive weapon to his tool kit. The sight even of a pipe-case shaped like a pistol has a powerful deterrent effect upon those with evil intent ; and, undoubtedly, it is true that there still exists in remote districts a number of lawless individuals to whom plunder is a daily occupation.

When on tour I recommend the rider to carry, in addition to his regular riding-suit, two extra pairs of hose, a thin dark-coloured flannel suit, an extra cap, a pair of light shoes, a Jaegar shirt, a good supply of collars and handkerchiefs, a waterproof coat, and a thin pair of waterproof overalls. This kit can be got into a Japanese rush basket, covered by a piece of American cloth and strapped upon the luggage carrier. The total weight will be under twenty pounds, and the rider will have the advantage of a complete change in the evening. I always find it refreshing to get out of dusty, travel-stained attire, and appear like a respectable citizen when a day's journey is done.

At times most riders will feel the want of ability to share the fun of their trips with a companion, and the problem arises as to the best method of taking a passenger with a motor-bicycle. Of course, there is the choice of buying a special machine for this purpose at the start ; but I am sorry to say that at present the tricar has not been such a success as one would wish. Sooner than invest in one of these heavy pattern machines I would make the plunge and buy a car straight away. From what I have seen it would be cheaper in the end and afford more comfort.





*Photo lent by S. F. Edge, Esq.*

*A Club run in Olden Times.*



Personally I think the heavy tricars cannot properly be classed as motor-cycles at all. They are in reality three-wheeled motor-cars, entailing all the expenses of a car without its comforts and reliability. What the motor-cyclist requires is a handy means of readily attaching a passenger-carrying apparatus to his machine with the least trouble and without permanently interfering with the use of the bicycle in its legitimate sphere.

Undoubtedly the simplest of all passenger attachments is the trailer. It is the easiest attached and requires the least power to propel ; but it is not altogether as safe for the passenger as one would wish. In a tight corner the man on the bicycle is apt to forget all about the trailer—with disastrous consequences to the occupant. In spite of this it is a most handy little carriage to own. It can be attached in a couple of minutes, and often comes in useful in emergencies. The drawback which prevents many cyclists owning one is the extra licence demanded by the Excise. One can keep a forecar, a side-car, or a trailer for use with a push-cycle free ; but once attach the latter to a motor-cycle without a licence, and the course is clear for the tax-gatherer.

The forecar converts a powerful motor-bicycle into an efficient tricar, and one more useful, to my way of thinking, than a heavy tricar. Being of lighter construction, the upkeep is far lower, and one retains the simplicity of the motor-bicycle with plain belt-driving. I have had a lot of experience with this type of machine, and I have found it about the cheapest means of travelling yet discovered. Both the up-keep and fuel for the passengers are only a trifle above that entailed with a single machine. Carefully driven it is perfectly safe up to twenty-five miles an hour, but at higher speed than this much depends upon the driver's skill. In some 15,000 miles I have never yet been overturned. Once or twice I have been near it, with the speed indicator in the region of 35 ; but had I been driving a car under the same circumstances, the effect would probably have been the same, if not worse.

Although I do not use studded tyres, I have found the



type singularly free from side-slip, and when a slip has taken place it has been trivial in its effects. The worst slip I ever had was in the dust, when I went off the road and burst a tyre. It was entirely my own fault, and as I only had one hand on the bar at the time I was lucky in avoiding an upset. Eleven spokes had to be replaced when I got home, showing how severe the strain had been.

The spokes of the steering-wheels in forecars should be actually stouter than those of the driving-wheel. In my machine I have thirteen gauge wires, and the driver has never been touched; but I have rebuilt the steerers twice. It is always the spokes on the inside flange which snap, or in some instances actually pull the washers through the rims. Fortunately these wheels do not appear prone to collapse suddenly. They run for several thousand miles, when the metal gets tired, and spoke after spoke fails, telling one it is time to effect a renewal.

In choosing a forecar insist on one with the passenger seat low down. Six inches clearance under the bottom is enough to clear any road obstacles, and the lower this seat the greater the stability, and the better view the driver will have. It is very annoying to have to crane one's neck to see round the passenger's head. I much prefer a large, roomy basket to a "coach-built body." It is cheaper, lighter, and more comfortable to sit in. In the event of an accident the basket is seldom damaged, but the wood in a coach-built affair takes a very small concussion to splinter it.

If ordering a basket-seat, get a good plain wicker one—the variety known as "Art Cane" is a tawdry affair, vulgar in conception, and destitute of durability. The disadvantages of the forecar are its weight, the shielding of the engine from air currents, and the time it takes to attach. The two former can be overcome by the use of a good powerful engine not given to overheating, which is another name for overloading. The latter is so serious that I would never recommend any rider who contemplated making frequent changes to invest in a forecar.

For the rider who indulges but occasionally in passenger

work the side-car offers many advantages. Although far from a theoretically correct mechanical appliance, it is one of those things which work well in practice. It is very sociable and tolerably safe. It takes a little practice to master the steering, especially with a rigid pattern, but the rider soon gets used to this, and the advantage of its easy attachment and detachment is great. It also affords no inducement for a visit from the tax-gatherer. It undoubtedly has a future in the history of the motor-cycle, although I myself have never been enamoured of it.

In concluding these words of advice to the users of the most economical form of automobile yet devised, I would advise all riders on tour to remember it pays to go slowly round corners, to treat strange hills with respect, and, whether touring or embarking on a trial of skill in a reliability contest, not to take out untried accessories. Put not your trust in a new machine, new belt, or even a new tyre, until you have tested it.

## CHAPTER XXXI

### A Word about the Motor-boat

BY MAWDSLEY BROOKE

I BELIEVE it was in the year 1892, when sailing upon Oulton Broad, I saw a boat of about 16 ft. in length, with a box in the centre of it, coming towards me at quite a respectable speed.

There was no smoke, and practically no noise, and my engineering instincts were at once awakened to investigate this boat, fitted with what I assumed to be a benzoline engine such as I had read of.

This boat, now known as "The Old Tub," and still running well, I discovered to belong to Mr. Estcourt; and mutual interests led us to become fast friends.

It was, I found, fitted with (as I assumed) a benzoline engine—this proving to be the first engine sent over to this country by Herr Gottleib Daimler.

Being an enthusiast concerning all things which float, I at once was able to see the possibilities of this type of boat and the developments that were possible; and from that day the study of the petrol engine has been one of my keenest interests.

My first personal experiment with an internal combustion engine was at the instigation of Mr. Estcourt, who had the ingenious idea that we could utilise the exhaust, and that we could, moreover, employ the heat thus generated in cooling the engine. This we actually did in 1899, and the resulting machine, I believe, represented the birth of the three-cylinder international combustion engine.

We had two outside cylinders working on petrol, and in





A Brooke Motor-boat on Oulton Broad.



*Photo by permission of J. W. Brooke & Co., Ltd.*

"Baby II." doing 14 Knots.



the middle cylinder we utilised the exhaust and the steam generated from the outside cylinder.

Although the motor ran, it was very short-lived, and an ordinary three-cylinder engine was built up instead and installed in a large house-boat possessed by Mr. Estcourt, in which house-boat this particular engine is still running, and running satisfactorily ; and I believe I am right in saying that the motor has never been taken out of the boat.

After this matters began to stumble along much more rapidly. Mr. Harmsworth (now Lord Northcliffe) offered the Harmsworth Cup for motor-boats, to be raced for in Cork Harbour in the same year that the Gordon-Bennett Race was run in Ireland. For this cup I essayed to build a motor. The motor was built and installed in a boat, but we were too late with it to enter it ; and had we done so, I am convinced that we should have made no glorious display.

It is rather interesting to note that this engine, built in 1902, was a six-cylinder engine of 30 h.p. with synchronised ignition, and an engine, although totally different in design from our present six-cylinder engine, of precisely the same dimensions, having a bore of  $3\frac{5}{8}$  in. and a stroke of  $4\frac{3}{4}$  in.

Following this I built *Baby I.*, which was my first serious attempt at a racing boat, and this was in 1904.

The same year the Automobile Club held their first Twenty Hours Reliability Trials at Southampton, in which I took part with this boat, and in the same summer the Godfrey Barine Cup was won by one of our boats at Cowes ; but previous to this, there had been the Monaco Races, which were becoming quite a feature of the marine-motor world. In the spring of 1905 I built *Baby II.* for these races, a boat 30 feet long, 6 feet beam, and equipped with one of our 45-h.p. motors, and I think, perhaps, this boat has been one of the most consistently successful racing boats ever built.

I returned from Monaco feeling more or less a wealthy man, with my winnings, and since that time this boat, *Baby II.*, has been awarded the British Motor-Boat Club's Gold Medal, has won the A. J. Wilson Challenge Cup, the



Miall Green Cup, and two cups offered by the British Motor-Boat Club, and these as well as a very large number of "Firsts" secured in regattas round the coast.

In 1905, not contented with *Baby II.*, I built, in conjunction with Captain Corbet, a twelve-metre boat for the International Cup, to wit, *Brooke I.*, which boat I firmly believe was the fastest motor-boat ever built, but one in which we had considerable trouble with carburation. These troubles have now been overcome, and I am hoping to use the engine again next year.

The engine was, I think, the largest petrol engine that had ever been built, being rated at over 400 h.p., and having six cylinders 10 bore by 8 stroke, and arranged to run at 1,000 r.p.m.

This boat was timed to run twenty-seven knots, and was chosen as one of the representatives of Great Britain for the International Cup, and was sent over to Arcachon; in which race she participated, but owing again to carburation troubles did not succeed in coming in first.

During the whole of this period, from 1903 onwards, my firm had, in addition to building these one or two racing boats, been giving their very serious attention to completing a series of motors for ordinary commercial and pleasure purposes, and had been benefiting by the experience gained with these racing machines.

This heavy demand for these motors points to the continual growth of the motor-boat as an instrument of pleasure and of business. Bearing in mind the fact that in Sydney Harbour alone there are over six hundred motor-boats, that for the last two years motor-cruiser races have been held from London to Cowes in this country, and to Bermuda in America, that almost every yacht now built is equipped with a motor-tender, that the Government is using motor-boats for diplomatic purposes in our Colonies, that our lifeboats are being fitted with motors—then, I say, one can realise the enormous possibilities of the industry.

There are, of course, many types of marine motors being built, and many more types being put to the test; but there

is no doubt whatever that the Americans are far ahead of us with the two-stroke motor, a very large number of which is now being built. The English motor is, for the most part, one of the four-cycle type ; in fact, I do not know of any two-cycle English motors on the market. Tangyes at one time built a motor of this type, and a very good motor it was, I believe, but I understand they have since abandoned it.

The paraffin engine is the engine that must be used for commercial purposes entirely, owing chiefly to the cost of petrol ; but the combined petrol-paraffin engine is, in my opinion, wrong altogether in principle. A paraffin engine must essentially be designed for paraffin work, and must be of a totally different form of engine from that used for petrol. Usually a paraffin engine is quite unsuitable to a motor-boat intended for private purposes.

Let me conclude by recommending this splendid sport to all amateurs. A motor-boat is not costly, it is cheap to run, and there are excitements in the pastime surpassing any I know afloat.

## CHAPTER XXXII

### THE MOTOR CLUBS

I HAVE had cause frequently to refer, in the course of this volume, to the Royal Automobile Club of Great Britain and Ireland. Started originally as a social club, this great institution has, with the Motor Union, become the very "jockey club" of the movement. Not only is its authority widely recognised, but its quasi-democratic nature justifies the position it has taken in the motoring industry. This great club defends our interests everywhere; it makes it its business to help the tourist, both at home and abroad; it is the tribunal by which the leading manufacturers will be judged; it is the great cosmopolitan rendezvous whither repair all those who are seeking either counsel or society.

At the time of writing all the talk is of the club deserting the famous rooms in Piccadilly, and of moving to more commodious premises in Whitehall. This the friends of the Royal Automobile Club hope will come to pass. The present club-house is quite inadequate to the enormous demands made upon the staff. There should be in London one great building in which all motoring parliaments can meet. This the Royal Automobile Club will presently give us, and add a new title to the Royal favour so generously bestowed upon it.

Akin to this great club, and in a measure alive with it, is the famous Motor Union. There is probably no harder worker in London than Mr. Rees Jeffreys, who is responsible for this splendid organisation. Speaking of its objects, he writes me the following notes:

#### THE MOTOR UNION OF GREAT BRITAIN AND IRELAND

The Motor Union is the largest organisation of users of motor-cars in the world, and includes in its membership upwards of one hundred clubs, in addition to a large number of individual members. Its aggregate membership is upwards of 18,000. Its growth is shown by the following figures:



Class of Members.	Number of Clubs.						Number of Members.					
	March 1903.	March 1904.	March 1905.	March 1906.	March 1907.	July 1907.	March 1903.	March 1904.	March 1905.	March 1906.	March 1907.	July 1907.
Royal A.C. . . . .	1	1	1	1	1	1	2,260	2,515	2,562	2,800	3,045	3,226
Clubs affiliated under Standard Scheme 1 . . . . .	9	23	35	49	61	64	731	1,672	3,198	5,199	6,907	8,248
Motor Cycling Clubs . . . . .	—	1	1	11	23	32	—	147	18	566	1,162	1,894
Ladies' A.C. . . . .	—	1	1	1	1	1	—	227	325	360	359	382
Motor Cycle Union of Ireland . . . . .	—	—	1	1	1	2	—	—	90	90	72	175
Commercial Motor Users' Association . . . . .	—	1	1	1	1	1	—	108	150	200	197	230
Individual Members of the Union . . . . .	—	—	—	—	—	—	97	467	750	2,050	3,050	4,148
	10	27	40	64	88	101	3,088	5,136	7,255	11,265	14,792	18,303

Inaugurated in 1901, the Motor Union exists to advance the automobile movement in the United Kingdom, to protect and extend the rights and privileges of automobilists, and to encourage and facilitate touring by means of mechanically propelled vehicles. The advantages of membership of the Union include legal information and advice free of charge; financial support in legal proceedings and in appeals to Quarter Sessions against convictions; the services of competent solicitors; information as to routes at home and abroad, and as to Customs formalities; the services of the Royal Automobile Club engineer at moderate charges; the right to carry the badge of the Union, whereby a member charged with a motor-car offence may have half his legal expenses refunded; and the right to be consulted on general questions affecting the rights and privileges of automobilists. It has also its own insurance company, whereby members have special facilities for insuring their cars.

Apart from these personal advantages, the Motor Union is the recognised authority for safeguarding the legislative rights and privileges of motorists. It opposes public and private Bills introduced into Parliament, and local by-laws embodying proposals restrictive to automobilism. It laid the case for automobilism before the Royal Commission on Motor-cars, when many of its recommendations were accepted by the Commissioners, and it is hoped, as a result, that the benefit will be felt when the new legislation comes into force. The Union negotiates with local authorities for the improvement of the roads and the removal of dangerous corners. It also protects its members from the imposition of illegal bridge tolls, as in the case of the Langstone Bridge, Havant, where the matter was carried by the Union into Court, with the result that a 50 per cent. reduction was obtained.

The legal department of the Union is one of the most appreciated by the membership. It has fought all the principal test cases. The first important principle established was in an appeal, under section 1 of the Motor-Car Act, which it carried into the Divisional Court, when (*Rex v. Wells*) the decision was obtained that the grouping of

summonses under section 1 of the Act, that is, charging a motorist, for instance, with driving at a *speed* dangerous to the public, and also of driving in a *manner* dangerous to the public, is bad in law. A motorist, therefore, can only be charged with and convicted of one offence on one summons under this section. The Union obtained the decision in the Appeal Court that it is not unlawful for a member of the public to notify motorists of the existence of police traps. More recently it obtained the decision that a supply of water for doctors' cars does not come within the definition of a supply for business purposes, and that, therefore, they are not liable to be charged a special water rate, a decision which has been followed with beneficial pecuniary results to medical men using cars all over the country. Another decision obtained about the same time is that a motorist who has been convicted for exceeding the speed limit in the royal parks cannot have his licence endorsed for a first or second offence, and as a result of these endorsements being pronounced illegal, some hundreds of motorists have had previously existing ones removed from their licences. There is an average daily application for advice of six members.

In addition, the Union, through its Highways Protection Committee, has during the past year or so secured the conviction of seventeen people for offences committed on the highway—six for assault, nine for obstruction, and two for stone-throwing. Further to protect the considerate motorist on the road, the Union is now organising a system of road agents in various parts of the country to act with the police in warning drivers of dangerous places, and advising motorists when driving through villages and towns where special caution is necessary. This action has been rendered necessary in order to try to check the increasing demands for five- and ten-mile speed limits which are being made by the local authorities. Since the Act of 1903 came into force there have been twenty-five local inquiries held in England and Wales, at each of which the Union has been represented. The results have been that out of thirteen applications no speed limit was granted, one application was withdrawn, while the remainder



have been acceded to only in regard to certain roads and certain lengths of roads.

The Union has also taken an active part in the efforts to do away with the dust evil. At its instigation a series of tests and competitions were held in the spring of 1907 on some of the Middlesex roads, the Roads Improvements Association carrying out the arrangements and the Royal Automobile Club and the Union making up the expense between them. Handsome prizes were offered for the best tar-spraying machine and for the best preparation of tar for road purposes. The tests show the attention that is being paid to the subject by road engineers and local road authorities, many of whom sent representatives to witness and report on the trials.

The annual subscription is one guinea only, and life members can be elected for a subscription of ten guineas. The Secretary is Mr. Rees Jeffreys, and the offices are at 1, Albemarle Street, Piccadilly, London, W.

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Differing entirely in its purposes from the Motor Union, the recent years have given us that most admirable organisation, the Automobile Association. It is impossible to praise too highly the work that has been done by the Committee, and its indefatigable Secretary, Mr. Stenson Cooke. Possibly motorists would have been driven from the southern roads altogether had it not been for the Association's scouts.

For a subscription of two guineas the careful driver is now protected everywhere, while his subscription insures that the inconsiderate driver shall be watched no less diligently. This is the day when motorists are beginning to realise that they must drive the "road-hog" from their midst or seriously cripple, if not destroy, this delightful pastime. The Automobile Association is enabling us to do so. Its story, briefly set out by Mr. Stenson Cooke, cannot fail to be interesting both to members and others.

## THE EVOLUTION OF THE AUTOMOBILE ASSOCIATION

The story of the Automobile Association might well be headed "Two Years Ago" if Charles Kingsley had not already appropriated the title.

In view of its extraordinary development and rapid success, it seems almost incredible that it was not until September 1st, 1905, that the Secretary commenced work in a tiny office in Fleet Street. The number of members was then only ninety, and the bank balance fell short of three figures. At the time the prospects did not look particularly brilliant, but the enthusiasm of the workers has changed the whole outlook in the most extraordinary fashion. On September 1st, 1907, the membership of the Automobile Association was well over four thousand, and its reserve fund exceeded that substantial number of pounds sterling.

Two years ago the Secretary managed all the details of the organisation single-handed during the week, while on Saturdays and Sundays he was out on first one car and then another inspecting the roads and the small Cyclist Patrol Corps, which was then, and still is, in fact, the leading feature of the Automobile Association, drilling the men and keeping them up to their duties. Now the road department numbers over one hundred and fifty employees, and more than £8,000 a year is being paid in wages alone. In addition, local agents have been established on all the main roads of England, Scotland, and Wales, and so much ground has been covered in this way that to visit each agent personally would involve a motor-car tour of over twelve thousand miles.

Now the offices of the Automobile Association have been changed from the one small room in Fleet Street to splendid premises in the West End, in Prince's Buildings, Coventry Street, W., and here, in place of the single-handed Secretary, there is a large and well-organised staff, which finds plenty of work to do in the day. Letters at the rate of five hundred a week have to be dealt with, to say nothing of telegrams and telephones going all day long ; and there is, in addition, a constant stream of callers, who range in social position from

the best-known members of the peerage down to the humble, but necessary mechanic.

Two years ago the Committee waxed enthusiastic over the election of fourteen new members at one of the fortnightly meetings. At the last half-dozen meetings of the Committee, however, over two hundred new members have been elected at each sitting.

All this has come about in the short space of two years ; and out of a small inception a vast organisation has evolved itself. And why ? Because the Automobile Association was called into existence by a genuine public need, and because it has fulfilled functions which no one else was dealing with.

One of the great features of the Automobile Association is that it *gets things done*. It was founded by a small body of enthusiastic sportsmen working without remuneration, solely in the interests of sport, and their enthusiasm has increased rather than waned.

The Chairman, Col. W. J. Bosworth, and the Committee—which contains such well-known names as Sir Archibald MacDonald, Capt. J. Bennett-Stanford, Lieut.-Col. Mark Mayhew, Earl Russell, Messrs. S. F. Edge, Charles Jarrott, D'Arcy Baker, C. W. Brown, C. Cordingley, Harvey Du Cros, junr., Walter Gibbond, Alfred Harris, H. S. A. Smith, Charles Temperley—all have justified the reputation of being strong and enthusiastic workers without any thought of personal gain—men who are alive to every possibility, and grasp and exploit every opportunity for development, regardless of ritual and red tape.

The policy of the Automobile Association is to make motoring pleasant and motorists popular, to protect motorists in the exercise of their right to the reasonable use of the highways, and, at the same time, to protect users of the road against unfair driving. The Automobile Association cyclists patrol the roads, and it has been well said that “every time a scout holds up his hand you save your subscription.” The Association agents, too, are always watching the roads, and advise motorists of dangerous spots ; and, in addition, they will repair the cars of members on special terms, secure hotel



accommodation for them, and receive letters and telegrams. Furthermore, the Association has placed signs outside small towns and villages to inform all motorists where they are and to advise them of danger, and also has put guides upon the road to conduct members through large towns.

The Automobile Association underwriters insure members at Lloyds under what is certainly the most liberal policy existing, while the Association's lawyers give the members legal advice, and are prepared to defend them in any police-court proceedings under the Motor-Car Acts for twelve months for the inclusive fee of two guineas.

The Automobile Association badge is well known to everybody on the road, and has established a sort of freemasonry amongst members. In practice the Automobile Association does all that it professes to do, with the result that at a recent public dinner a well-known motorist said in his speech that the Automobile Association is one of the too few motoring organisations from which he got full value for his subscription.

The scope for such a practical, common-sense organisation is almost without limit, and each meeting of the Committee sees the functions of the Association increasing on practical lines.

Until recently it has been a reasonable cause for complaint from motorists in the North and the Midlands that the Southern counties were unduly favoured in the matter of scouts, but this has now been removed by the establishment of a large Northern branch in Manchester, from which the roads are being organised and patrolled with a lavishness equal in every way to that which marks the work at headquarters.

The Automobile Association offices in Manchester are excellently situated at 30, Cross Street, in the very centre of the town.

The benefits of the Automobile Association are, however, by no means confined to its members. It has always been part of its policy to protect all motorists on the road, irrespective of whether their cars carried the member's badge or not, and the

public are benefited by the village signs, danger notices, and warning boards which have been erected by hundreds in all parts of the United Kingdom. This important work is being very carefully carried out, and no danger sign with the familiar "A.A." upon it is allowed to be erected until an official of the Association has inspected the spot and certified that a warning is absolutely necessary. Thus there is no fear of the cry of "Wolf! wolf!" from the drivers, and the public are protected from the danger of thoughtless driving.

Amongst other lines upon which the Automobile Association is proposing to develop is the admission of motorcyclists to the privilege of membership at the subscription of half a guinea per annum; and the establishment of touring facilities is looming large in the eye of the executive.

To sum up, the Automobile Association was called into existence to fill an urgent want, and has filled it so successfully that it has become a tremendous organisation. Always working and always developing in the best interests of automobilism, its originators and organisers find their reward in its immense success.

\* \* \* \* \*

Lastly, a word for the New Motor Club in Coventry Street. This is purely a social organisation, and a very delightful one at that. It occupies the well-known buildings at the corner of Coventry Street, and is the daily rendezvous of many well-known figures in the motoring world.

## SOME DRIVING MAXIMS.

*NEVER* pass another vehicle, proceeding in your direction, upon a corner.

*If you see any possible difficulty ahead, go dead slow. Never take the risk of the road clearing by the time you arrive.*

*Pass cattle dead slow. They cross the road for the same reason as a chicken—to get to the other side. They will probably choose the moment of your appearance.*

*Be very chary of the timber lorry. If the horse drawing it gives the slightest sign of fear, pull up some distance from him. Should he shy, the timber will swing out over the road, and try conclusions with your head. Do not submit to insulting comparisons.*

*Learn to let the engine brake the car. A good driver uses his brakes but rarely. He runs up to danger with a closed throttle.*

*Beware of fast driving over ruts. They throw the car about like a ball. They may throw you off the road.*

*Cars will not side-slip upon snow, but will slip upon ice. Non-skid bands make matters worse under these conditions.*

*Remember that non-skids will slip upon a very dry road if you are taking a corner at high speeds. They will also skid freely upon wet flags or pavé.*

*A front-wheel skid calls for the application of the brakes; a back-wheel skid never. If your car be given to skidding upon the front wheels, have a non-skid upon the off fore wheel. It will hold you round the corners. Dunlop non-skids upon the front wheel are splendid.*

*Clutch slipping upon a leather-faced clutch is the habit of the poor driver, or of a clever rogue with a bad car to sell.*



*Never open the throttle with a jerk. Advance it notch by notch or you will choke your engine.*

*Do not drive with ignition retarded. The condition of your valves is not improved thereby, nor of your cylinder heads.*

*Beware of allowing your engine to knock. Retard the ignition notch by notch until the knock ceases.*

*But remember, also, that a knock may sometimes come from over-retarded ignition attending carburettor deficiencies, and that an advance may check it. Experience alone is a guide to this.*

*If your engine gets very hot in traffic, try driving her with the throttle almost closed, and the ignition well advanced. In this case, she must be kept upon the highest speed she will take.*

*Never pass a tram-car, proceeding in your direction, upon the off-side until you can see the road is absolutely clear.*

*Horn at approaching carts of the heavy order. There may be a small boy hanging on behind.*

*Never drive five miles in ignorance of what your lubricator is showing you. The oil may not be flowing. In this case your subsequent bill may be anything between ten pounds and a hundred.*

*Do not zig-zag about the roads, but take smooth and steady curves. Let your alteration of direction be gradual. Pass well out from the off coming in again gradually.*

*Never do "stunts" with your car. The insurance companies do not like it.*

*When the ostler fills up your petrol tank with water, remember that he may have children depending upon him.*

*Think half-a-mile ahead when driving a fast car. The other man is sure to do the wrong thing.*

*Do not use your side-brakes upon a corner. They may give you a skid if they are not perfectly compensated.*

*Try your brakes every morning directly you are upon the road.*

*Always give a glance at the change-speed lever before getting down from the driver's seat.*

*If you break a chain, fix the sprocket thereof, and drive home slowly.*

*Do not always be going "all out." Remember the Chinaman who said, "Go like hellee, walk five milee."*

*Beware of the right-hand corner. Make a wide sweep and horn freely.*

*Never pass a Street Refuge at a greater speed than a crawl.*





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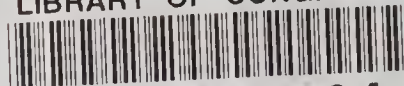
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